ASSESSING READINESS OF THE SAUDI CONSTRUCTION ORGANIZATIONS FOR BUSINESS PROCESS REENGINEERING

BY

Ahmad Abzakh

A Thesis Presented to the
DEANSHIP OF GRADUATE STUDIES

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DHAHRAN, SAUDI ARABIA

In Partial Fulfillment of the
Requirements for the Degree of

MASTER OF SCIENCE

In

CONSTRUCTION ENGINEERING AND MANAGEMENT

February 2017

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DHAHRAN- 31261, SAUDI ARABIA

DEANSHIP OF GRADUATE STUDIES

This thesis, written by Ahmad Abzakh under the direction his thesis advisor and approved by his thesis committee, has been presented and accepted by the Dean of Graduate Studies, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE IN CONSTRUCTION ENGINEERING AND MANAGEMENT.**

Dr. Laith Hadidi
(Advisor)

Dr. Khalaf Al Ofi
Department Chairman

Dr. Sadi Assaf
(Member)

Dr. Salam A. Zummo
Dean of Graduate Studies

Dr. Khalaf Al Ofi
(Member)

14/3/17
Date

Dedicated to my Mother, my Father and my Sister. For they have provided the support, love and affection, and whose contribution is beyond words.

In memory of the beloved ones, my grandparents.

And to the beauty and harmony in the world

ACKNOWLEDGMENTS

First and foremost, for our almighty God, who have my undying and deep gratitude and who have blessed me with the health and strength so far in my journey of life.

For my three family members, who showed nothing but support during not only my college years but rather my whole life. Thank you for your ongoing support and your unconditional love.

For my thesis adviser, Dr. Laith Hadidi, thank you for being a great mentor through this research and for your guidance, thank you for your understanding and patience. Most importantly, I will miss the deep and profound yet enjoyable conversations in your office.

For the committee members, Prof. Sadi Assaf and Dr. Khalaf Al Ofi, thank you for your encouragement along the path of my research and for being an effective part in this study.

A special thanks goes to Dr. Soliman Al Mohawis, thank you for your insights whether they were related to life or to academia. Thank you for being a challenge in class, your effective ways and methods are and will always be remembered.

For everyone who participated in this study, thank for your valuable time and for bearing with me. Thank you for sharing your knowledge and experience with me.

For all my friends, the two Ashmawi's, Sha'at, Abdullah Al Faris, Shubair, Mounir, Rafea, Ratrout, Sha'er and finally the very loud Moses. Thank you for the good days and the good laughs we had.

Lastly, a special appreciation goes to my University KFUPM, for which it provided us with all the necessary means to make this research possible.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

BPR: Business Process Reengineering

CSF: Critical Success Factor

Ob1: Objective 1

Ob2: Objective 2

Ob3: Objective 3

Ob4: Objective 4

Imprt. I: Importance Index

Impl. I: Implementation Index

R.I.: Readiness Index

ABSTRACT

Full Name : [Ahmad Imran Abzakh]

Thesis Title : [Assessing the Readiness of the Saudi Construction Organizations for Business Process Reengineering]

Major Field : [Construction Engineering and Management]

Date of Degree : [February, 2017]

The Saudi construction industry nowadays is facing huge changes on the economic and regulatory aspects. This is in large due to the economic downturn the kingdom is facing and the high volatility that oil prices are witnessing. The Saudi construction organizations are forced to adapt to the current market demand, new governmental regulations and the fierce competition that comes alongside with them. Yet, the construction industry fails to realize the power of change while other industries did several decades ago. The construction industry is suffering from low productivities, increased costs and sluggish technological advancements. All of which entails that radical changes within the Saudi construction industry medium can be the cure if properly approached. Stemming from these facts are the objectives of this research, assessing the readiness to BPR implementation in order to insure a healthy change and to explore the perceptions and attitudes toward BPR to enhance the body of knowledge with regards to the subject.

The data collected in this research was through survey questionnaires that comprised, first, questions related to assessing the readiness through 20 identified CSF. Second, questions related to the perceptions and attitudes toward constituents of BPR. Questionnaires are distributed among Grade A contractors in the eastern province of the Kingdom.

The results of assessing readiness reveal a major lag in each of the proposed critical success factors. Nevertheless, the findings of perceptions and attitudes reveal a general acceptance and positivity toward business process reengineering constituents, an overall tendency toward integrating IT with business functions and communications, developing flexible management systems, and encouraging and empowering employees to generate value through their jobs with more delegated authority.

ملخص الرسالة

الاسم الكامل: أحمد عمران أبزاخ

عنوان الرسالة: تقييم جاهزية شركات الانشاءات السعوديه لإعادة هندسة عمليات العمل

التخصص: إدارة وهندسة التشييد

تاريخ الدرجة العلمية: فبراير، 2017

سوق الانشاءات السعودي في يومنا الحاضر يشهد تغيرات كبيره على الاصعده الاقتصاديه والتنظيميه. يعزى هذا التغير بشكل كبير للانكماش الاقتصادي والتقلبات في أسعار النفط التي تشهدها المملكه. إنه لمن الضروره لشركات الانشاءات السعوديه أن تتأقلم مع المتطلبات الحاليه للسوق، التنظيمات الحكوميه الجديده وما يتبعهما من منافسه. مع ذلك، سوق الانشاءات يفشل في استيعاب قدرة وأهمية التغيير في حين أن غيرها من الصناعات قد استوعبت تلك الاهميه منذ عدة عقود مضت.إن سوق الانشاءات بشكل عام يعاني من انخفاض في الانتاجيه، ازدياد في النفقات وتراجع في التقدم التكنولوجي. كل ما ذكر يستلزم وجود تغييرات جذريه داخل شركات الانشاءات السعوديه مما قد يكون العلاج للعيوب التي ذكرت مسبقا اذا تم مقاربة هذا التغيير بشكل مناسب. أهداف هذه الدراسه تنبع من الحقائق التي تم سردها، وهي كالتالي، تقييم جاهزية سوق الانشاءات السعودي للقيام بتغييرات جذريه لضمان برنامج تغيير ناجح و دراسة مدى فهم سوق الانشاءات السعودي للعناصر الاساسيه المرتبطه بالتغييرات الجذريه بهدف تحسين الجسم المعرفي خلف موضوع إعادة هندسة عمليات العمل.

تم جمع البيانات بخصوص هذا البحث عن طريق إستبيان مصمم للسؤال أولا عن جاهزية الشركات من خلال طرح ما يعادل عشرين عامل مهم للنجاح والتأكد من تطبيقهم في هذه الشركات. ثانيا، تم السؤال عن فهم وإدراك المشتركين في الاجابه عن الاستبان بخصوص العناصر الاساسيه المرتبطه بالتغييرات الجذريه. تم توزيع الاستبيان على مقاولين الدرجه الاولى في المنطقه الشرقيه للمملكه العربيه السعوديه.

تمخض عن تحليل نتائج تقييم الجاهزيه أن هناك تراجع في تطبيق كل عوامل النجاح المقترحه. ولكن بالرغم من ذلك، النتائج المستقاه من فهم وادراك المشتركين في الاستبيان تظهر قبول عام لعناصر إعادة هندسة عمليات العمل، ميل لدمج تكنولوجيا المعلومات مع وظائف العمل ونقل الاتصالات، تطوير أنظمه إداريه مرنه و أخيرا تشجيع و تمكين الموظفين والموظفات لاحداث قيمه وأهميه من خلال وظائفهم بتفوضيهم سلطه بدرجه أكبر.

CHAPTER 1

INTRODUCTION

Projects in the construction industry are well recognized as being of a complex nature. The construction industry is also well known to have disruptive projects with delayed plans, budget overruns and in most cases low productivity. While other industries are scoring better on those three measures. Improvements to projects' plans, budgets and productivity means that organizations in the industry should embark on changes to the way they do business and to their organizations. These improvements go parallel with clients looking for higher quality and more cost effective projects anchored with improved technology and construction methods.

Advances in the construction industry can start from within organizations. By enhancing core processes of the organization and re-engineering them. The concept of Business Process Reengineering is considered to be a helpful tool when utilized to enhance processes as it is evident in many other industries. Construction industry in general has little to do with similar concepts, however, it should. Projects now are ever more complex than before and the need to keep with the pace of technology has amplified.

With the economic downturn the Kingdom is facing, high volatility in oil prices and organizations cutting costs and laying off employees. The need to redesign the business process becomes manifest. This research is expected to contribute to the improvement of

the construction organizations in Saudi Arabia by studying their readiness to implement a change strategy which is Business Process Reengineering.

This research investigates the degree of readiness of the Saudi construction organizations to change through business process reengineering by studying the critical success factors to its implementation. Moreover, the research explores the perceptions and attitudes of the Saudi construction organizations toward BPR constituents in an attempt to enhance the body of knowledge pertaining to BPR in the construction industry. This report addresses the rationale on which this research is based, the implemented approaches and their findings.

The issue of low productivity and resistance to change in the construction industry are of a great concern. Their damage extends not only to stagnating profit margins, but to other factors such as customer satisfaction. On the other hand, many other industries similar to construction such as manufacturing are enjoying better profit margins and productivity. The operating model of the construction industry is not sophisticated or efficient as it could be and at the same time projects are becoming more mega type of projects with more complex issues. Many organization improvement tools used to optimize processes implemented several decades ago by other industries are now just penetrating construction operations. To gain full benefit from higher productivity rates, construction organizations have to enhance their operations and structures as well as their exposure to new technologies. In other industries, it has been evident that the first movers can construct a sustainable competitive advantage and this might be the case for the construction industry in the coming few decades. The first to move towards change will most likely be a leader

in innovation, technology and digitization. With that being said, looking at the construction industry in Saudi Arabia raises some important questions:

Is the construction industry able to take on a change initiative such as BPR?

What core process in a construction organization is more important to implement BPR to?

Do construction organizations have the right leadership skills to implement BPR?

Do construction organizations have the appropriate top management commitment for such an initiative?

Are firms in the construction industry ready to change their management system and organization structures to cope with changes?

Are the construction organizations ready to adopt new technologies and IT infrastructure to totally reform their operations?

1.1 Objectives

This research aims to investigate the readiness of the construction organizations in Saudi Arabia to implement a process improvement tool which is Business Process Reengineering. Specifically:

1. Prioritizing core processes of the construction organizations in terms of generating value and BPR applicability importance. (Ob1)
2. Evaluating critical success factors for BPR implementation in the Saudi construction industry. (Ob2)

3. Developing a readiness assessment tool for construction organizations in Saudi Arabia. (Ob3)

Added to the issue of readiness is exploring the perceptions and attitudes of the Saudi construction industry toward the constituents of BPR. The main objective of exploring perceptions and attitudes is to enhance the body of knowledge of BPR in the construction industry. (Ob4). Table 1 demonstrate how each objective is achieved in this research.

Nowadays, the Kingdom of Saudi Arabia is facing an economic turmoil and volatile oil prices. This downturn in the economy is affecting almost every industry and lots of damage are reaching the construction industry. More plunges in organizations' profit margins, more cutting off costs and laying off employees. At the same time the Saudi government are embarking on new changes and reforms by opening up the market for more companies outside the Kingdom which poses more competition. Moreover, the government are undertaking new public megaprojects that are of a complex nature which is challenging for organizations in the current economic situation. Therefore, the quest to improve the construction processes to cope with the external changes becomes manifest. This research is expected to contribute to the improvement of the construction organizations in Saudi Arabia through:

1. Providing an assessment tool for the readiness of Saudi construction organizations to change.
2. Presenting several BPR success factors that enable and smoothen change.
3. The findings of the research are expected to contribute in future investigations related to the subject.

4. Draw attention of experts to the problem, hence, attracting more research to handle such problem.

Several limitations govern this research; they are:

1. The research will be limited to contractors in the Eastern Province only.
2. The research is limited to Grade 1 contractors assuming that they have the adequate resources to take on the risk and invest money on initiating a BPR program
3. Respondents may not be familiar with the concept of BPR, however, it can be overcome by asking only about constituents of BPR without bringing it up to discussion.
4. Answers by respondents maybe biased towards their educational and working background as the subject of BPR touches on several organizational dimensions.

1.2 Thesis Layout

The thesis layout is organized in the following manner:

Chapter 1: Introduction

This chapter provides the reader with an introduction about the topic and addresses the need for conducting it in the Saudi construction industry. Moreover, it presents the objectives of the study and the means to meet them as well as the expected outcomes upon completion.

Chapter 2: Literature Review

This chapter explores the concept of BPR and offers an exhaustive literature review about the subject origins and history, organizational change and its relevance to BPR,

key success factors to BPR implementation and strategic implementation methods. It also discusses previous studies in which BPR readiness was assessed through a set of critical success factors that are thoroughly discussed is depth. Moreover, it includes some statistical facts about the construction industry and its current standing as well as some of its draw backs and lack of performance. Finally, it discusses areas of different organizational structures and designs.

Chapter 3: Research Methodology

This chapter discusses the methodologies followed in this research to meet the intended objectives. It includes the data collection approach and determination of the targeted population as well as the sample size calculations. It also presents the statistical tools used to analyze the collected data.

Chapter 4: (Publication 1) The Readiness of the Construction Industry to Change: An Assessment Through the Lens of Business Process Reengineering

This chapter is aimed to fulfill the requirements of objectives 1,2 and 3. It includes further points in reviewing the literature of business process reengineering and provides a detailed approach on how assessing the readiness of the Saudi construction organizations is achieved. It also discusses the developed research methodology with greater details and provides an in depth description and explanation on the analysis of the collected data. Finally, it includes discussion, general and future recommendations for research based on the outcomes of the analysis.

Chapter 5: (Publication 2) Enhancing the Business Process Reengineering Perception in the Construction Industry: the case of Saudi Arabia

This chapter is intended to fulfill objective 4. It includes further literature review on the subject of business process reengineering touching on different areas than the ones discussed in Chapter 4. This chapter explores new areas in BPR and incorporate them in the study. Finally, it gives away the results obtained from analyzing the collected data and draws a conclusion on the basis of the attained results.

Chapter 6: Conclusion and Recommendations

This chapter provides a summary of the drawn conclusion as well as the recommendations based on the findings in Chapter 4 and Chapter 5.

Table 1 demonstrates how each objective will be met in this research and in which chapter it is to be fulfilled. Also, Figure 1 depicts the general scheme of the methodology at which this research has been approached.

Table 1: Fulfillment of the objectives

Objectives	**Concerned Chapters**
Ob 1	**Chapter 4**
Ob 2	
Ob 3	
Ob 4	**Chapter 5**

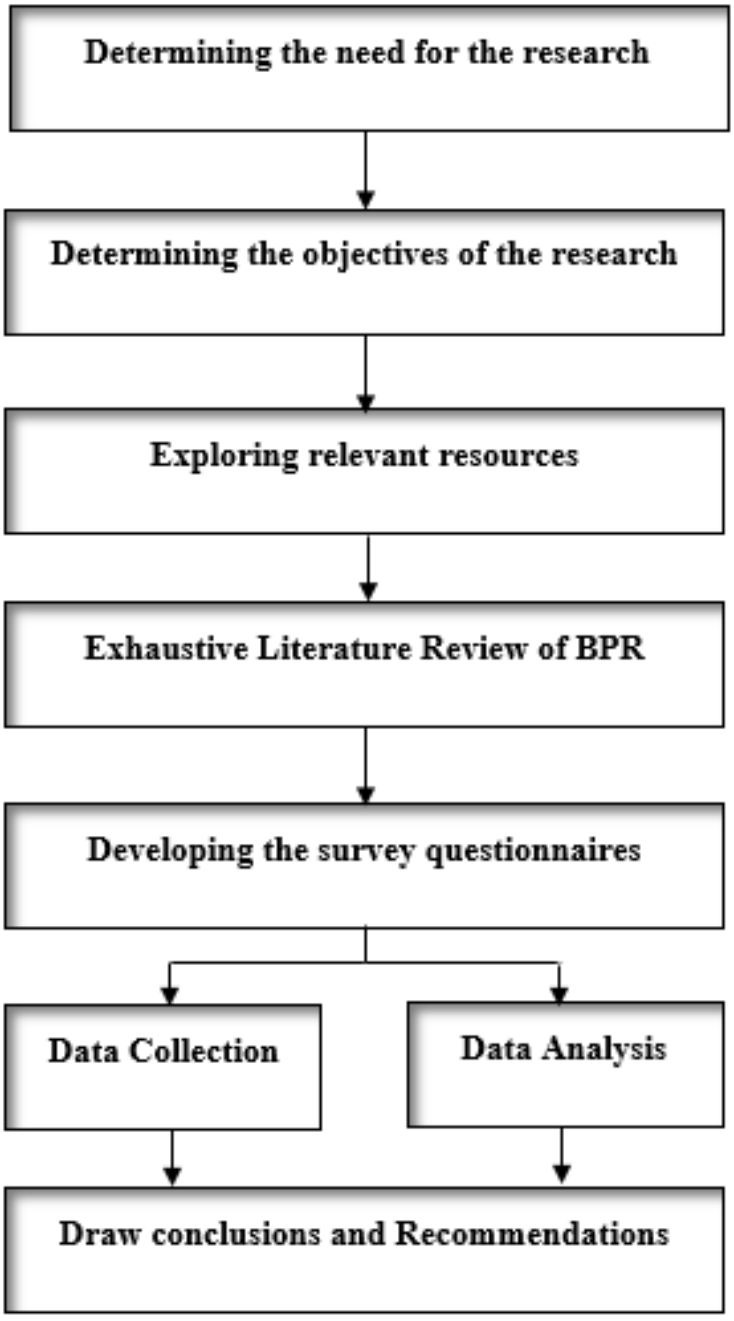

Figure 1: Research methodology scheme

CHAPTER 2

LITERATURE REVIEW

Multiple articles and books have addressed the fierce competitive environment and the nature of today's global markets. Most of these published documents agree that survival of organizations highly depends on providing newfangled services and products, improved quality and lower prices. However, it is rare to spot such qualities in most organizations and among those are the constructions companies. With that being said, organizations are now examining their approaches in doing business and developing new strategic plans to compete more efficiently (Corporation, 1995).

2.1 Origins of BPR and its Development

Although the concept originates back to theories developed earlier at the beginning of the 19th century by the father of scientific management Fredrick Taylor, the term BPR was first introduced in 1990 by Michael Hammer in an article in Harvard Business Review (Goksoy, Ozsoy, & Vayvay, 2012). According to (Hammer & Champy, Reengineering the Corporation a Manifesto for Business Revolution, 1993), Business Process Reengineering is defined as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical measures of performance". Business Process Reengineering has been defined frequently different in the literature and there is no consensus on only one definition (Goksoy, Ozsoy, & Vayvay, 2012). A second definition came from another scholar, Thomas Davenport, who also was heavily involved in the study

of BPR implementation where he defined it as “revolutionary new approach that uses information technology and human resources management to dramatically improve business performance”. In 1990, BPR was embraced by many consulting firms as a way to improve business processes and the first on the list when it came to strategic plans. (Abdul-Hadi, Al-Sudairi, & AlQahtani, 2005).

2.2 BPR and Organizational Change

Business Process Reengineering as defined earlier involves fundamental as well as radical changes. In the world of conducting business, the need to change is becoming increasingly manifest. As it goes parallel with maintaining a competitive advantage and success for organizations. Moreover, organizational change generally aims to create an atmosphere of adaptation, technology wise, product wise, administrative wise and human resources wise (Goksoy, Ozsoy, & Vayvay, 2012). As a consequence, organizations nowadays are embarking on new ways to conduct their processes by reengineering old practices and bringing novel procedures to do business (Al-Mashari & Zairi, Revisiting BPR: a Holistic Review of Practice and Development, 2000). In general, organizations are ought to change because of certain change drivers. Competition for example is now fierce in this global environment that we live in today, thus, organizations who seek to retain a competitive advantage are becoming more process enhancement oriented than ever before (Al-Mashari & Zairi, Revisiting BPR: a Holistic Review of Practice and Development, 2000). Another driver could be customers and how their perceptions and standards of provided services and products have changed with global companies penetrating national markets. In the past, markets where mostly national and few competitors dominated the business by providing

more or less the same service and product. As a response to globalization and open markets, organizations are needed to adopt to customers' specific needs and their satisfactory criteria (Al-Mashari & Zairi, Revisiting BPR: a Holistic Review of Practice and Development, 2000).

2.3 BPR Strategic Implementations Approaches

Different scholars and authors had differing views on multiple strategic implementations of a BPR initiative (Al-Mashari & Zairi, Revisiting BPR: a Holistic Review of Practice and Development, 2000). One famous approach piloted in multiple international organizations is by prioritizing the core processes. These prioritized processes are candidates to be reengineered to match the company's overall strategic goal. Even though it is attainable to pinpoint candidate processes intuitively, several firms do it systematically to make sure that there is a relation between a certain process and the company strategy (Teng, Grover, & Fedler, 1994). In construction however, and strictly speaking in Saudi Arabia, there is a lack of consensus on identifying core processes. This issue was at the top of the list of barriers to BPR implementation provided in a study by (Abdul-Hadi, Al-Sudairi, & AlQahtani, 2005).

Another famous school of thought advocated the total opposite. In this regard, the strategy of the company is first identified and then processes get aligned with that specific strategy. In this sense, processes are reengineered to fit a long term strategy that goes along with the dynamics of the market (Shmidt, 1998).

2.4 BPR Implementation and Success Factors

Since organizations has no control over the outside environmental factors affecting business, they can solicit changes from within and enhance their processes through Business Process Reengineering to better react to external influences (Hammer, Reengineering Work: Don't Automate, Obliterate, 1990). Initiating a BPR program involves taking risk as results can deviate from what is expected. Nevertheless, owing to the high expected outcomes, the acceptable risk levels that are taken during a BPR initiative will likely be greater than other management improvement tools (Crowe, Fong, Baumen, & Zayas-Castro, 2002). As many other organizational change initiatives, Business Process Reengineering has several factors that ensure successful implementation. Business Process Reengineering entails radical and fundamental changes to an organization's current system, rules and policies, structure and workers' responsibilities (Chan & Choi, 1997). It is mainly aimed to tackle issues in areas such as cost, quality and process time (Ozcelik, 2010). A successful BPR initiative should take into consideration a holistic view on organizational dimensions such as, IT and technology advancement, structure of the company, vision of the organization, culture and resources (Al-Mashari, Irani, & Zairi, Buiness Process Reengineering: a Survey of International Experience, 2001).

To a large extent, literature had reoccurring factors that enables a Business Process Reengineering initiative to be successful. For example, factors such as leadership, top management commitment, management system, organizational structure and information technology infrastructure are among the most to be mentioned (Al-Mashari & Zairi, 1999), (Davenport & Sbort, 1990) and (Hammer, 1990). Several other authors had identified

different success factors that are more or less interrelated to the previously mentioned. Among these factors are culture, processes, structure and technology. (Ahmad, Francis, & Zairi, 2007).

2.5 Assessing the Readiness for BPR

The combination of organizational dimensions that a BPR can improve makes its implementation very essential. As a result, there is an added complexity to BPR implementation that acquires a certain set of critical success factors to be evaluated, in order to ensure an effective implementation and at the same time avoiding any pitfall. (Al-Mashari & Zairi, BPR Implementation Process: An Analysis of Key Success and Failure Factors, 1999). Recent literature advocated that the first attempts to implement BPR were to a great extent radical, however, these implementations evolved to a softer process that included learnt lessons from successes and failures during application (Ozcelik, 2010). Unsurprisingly, failures and successes of a BPR initiative are intimately connected, and in a certain study handling the issue of BPR pitfalls, 70% of respondents agreed that a solid implementation of BPR acquires strong success factors (Boyle, 1995).

Several authors and scholars have assessed BPR through a lens of grouped success factors. The most reoccurring group of factors in the literature were compiled in a study conducted by (Abdolvand, Albadvi, & Ferdowsi, 2008), they are, leadership, top management commitment, change management system and use of information technology. Of course, these groups are associated with different sub-groups of their own.

2.5.1 Egalitarian Leadership Style

Egalitarian type of leadership promotes a more collaborative work environment compared to other leadership styles. Values is generated through positive communication between employees and the management, cooperative workplace, dynamic information flow and employee empowerment. Due to the democratic qualities that an egalitarian leadership scheme entails, it allows for a change to run smoothly in the organization with little resistance from employees. This effective interaction between different chains of command in an organization makes it more adaptable to changes (Crowe, Fong, Baumen, & Zayas-Castro, 2002). Added that BPR process is a top-down approach, however, apparently its success depends on involving employees who do the work and understand how the business is working (Paper & Chang, 2005).

There are of course several components in an egalitarian leadership style that can pave the road for a successful BPR implementation, they are: shared vision and information, open communication system, low tier employees' ideas are used constructively, confidence and trust between employees and cooperative environment that promotes teamwork and cross functional teams (Crowe, Fong, Baumen, & Zayas-Castro, 2002) and (Lee, 1995).

2.5.2 Top Management Commitment

Top management role in a BPR initiative is another important success factor. Top managers are at a seamless position to influence the organization environment and employees. Furthermore, top managers who show commitment by being personally involved in a change initiative are more likely to see successful BPR programs (Paper & Chang, 2005).

On the other hand, lack of consensus by executives on the beneficial outcomes of such change program is considered as a hurdle to successful implementation (Boyle, 1995).

A well-defined strategic vision at the top of the organizational pyramid is essential for a successful reengineering. Executives should have clear facts about the current standing of the organization, sufficient information about the initiative that is going to be undertaken and a realistic prospect of BPR outcomes (Abdolvand, Albadvi, & Ferdowsi, 2008). Moreover, top management should communicate with teams and employees during the change process for more feedback and more importantly to provide any needed resources (Crowe, Fong, Baumen, & Zayas-Castro, 2002).

2.5.3 Management System and Organizational Structure

Changing current management system and organizational structure has to be closely monitored to make sure that it is aligned with the reengineered processes. The newly designed management system should monitor any behavioral changes occurred to the BPR teams and employees (Crowe, Fong, Baumen, & Zayas-Castro, 2002). In reengineering projects, the human resources structure should be redesigned to foster sharing information and better decision making. Moreover, employees should be aided in the conversion period to better adapt to the new environment (Abdolvand, Albadvi, & Ferdowsi, 2008). Furthermore, organizational structure should act as a BPR enabler in the context of encouraging innovativeness and creativity, so there will be less bureaucratic processes and more participative ones (Ahmad, Francis, & Zairi, 2007).

The Business Process Reengineering literature is filled with evidence that changing the management system is highly dependent on managing the human resources in the

company. Employees in the organization should be highly qualified, well educated, self-motivated and most importantly responsible. Continuous learning and training as well as team empowerment are at the top requirements for a successful BPR (Peppard & Fitzgeraild, 1997). For organizations to survive, they should have teams that are capable to innovate new process designs. Moreover, those teams should be motivated and committed to a mutual purpose which value creation and particular performance goals (Katzenbach & Smith, 1993). Another important factor is to come up with a new reward system that goes along with the spirit of BPR. In a BPR program, reward is based upon value creation primarily, rather than basing it on working hours and other traditional methods (Peppard & Fitzgeraild, 1997). The change in management system basics are summarized by (Crowe, Fong, Baumen, & Zayas-Castro, 2002), they are, new reward system, updated communication channels, employee and team empowerment and updated education and training programs.

2.5.4 Use of Information Technology

Over the course of IT development, it has become apparent that using information technology is one of the most effective methods to facilitate organization processes redesign (Goksoy, Ozsoy, & Vayvay, 2012). Processes integrated with innovative and state of the art technologies will ensure successful redesigned procedures (Ahmad, Francis, & Zairi, 2007). Furthermore, several authors have viewed the use of information technology as an enabler to BPR to stress its importance (Davenport & Sbort, 1990) and (Chan & Choi, 1997).

Nowadays, information technology covers so much areas in an organization, that if an effective IT infrastructure existed, it will directly bring success to other critical success factors by tugging human, organization and business altogether (Abdolvand, Albadvi, & Ferdowsi, 2008).

Constituents of an effective IT infrastructure have been widely discussed by many practitioners and authors. Among these constituents are, investing in IT development, sufficient assessment of IT effectiveness, reengineering of legacy IS and finally effective use of software tools by training employees on using new technologies (Al-Mashari & Zairi, BPR Implementation Process: An Analysis of Key Success and Failure Factors, 1999).

2.6 Construction Industry View on BPR and Change

In general, the construction industry is a highly turbulent business environment. This in large due to its high sensitivity to economic cycles. Yet, the construction companies' implementation of business process reengineering (BPR) and other change management techniques is still limited although it is needed to cope with such changes.

2.6.1 The Industry Resistance to Change

Over the course of the past few decades, the construction industry has battled changes to the way they do business and also to their organizations. While other industries such as public administration and services had many successful change programs. The main goal of these changes were to improve performance of the organizations (Mohamed & Tucker, 1996). Organizations in the construction industry have restricted themselves to certain

technologies and processes. Moreover, these organizations are reluctant to adjust their operations, mainly because of fear of evoking unwanted changes (Hayes, Rezgui, Cooper, & Mitev, 1998). Resistance to change by organizations in the construction industry is mainly because of the hierarchal type of management they adopt (Abdul-Hadi, Al-Sudairi, & AlQahtani, 2005). Hierarchic companies are primarily superior when rapid growth and economic expansion exist. However, they score poorly when it comes to changes, because changes reduce managerial control, increase the competency of individuals at the organization and they dispose legacy systems and procedures. The overall shortcomings of hierarchic companies are well proved in the literature. They are viewed as being inflexible, unresponsive, lacking customer satisfaction, activity oriented rather than focusing on results and expensive because of the overhead costs associated with the task based activities (Corporation, 1995).

2.6.2 The Industry Productivity Imperative

In the construction industry, key principles in production such as cost effectiveness, utilization oriented design, in house quality management and delivery certainty do not always satisfy customer expectations. Furthermore, construction organizations have the reputation of not always seeking customer's satisfaction but rather focusing more on benefits.

Regardless of the claims that several projects were delivered according to plan and budget, it is still commonly alleged by professionals in the industry that estimated plans and budgets do not essentially reflect the actual or required cost and time. The extent of inherent time waste in the current construction practices is significant. Time waste in construction

could be attributed to construction processes and procedures or to delays and rework. All of which constitute a challenge for the efficiency and productivity of the industry (Mohamed & Tucker, 1996). According to a report prepared by Mckinsey&Compnay, the construction industry is lagging behind many other industries with regards to productivity, technological advancement and most importantly financial returns as well as investing in R&D. The report also shines the light on the fact that construction industry is the least digitized industry just before agriculture, when at the same time the industry is rife with paper work and blueprints (Agarwal, Chandrasekaran, & Sridhar, 2016).

In another study by the Mckinsey Global Institute, they estimated that $57 trillion dollars of investment in infrastructure projects will be required by 2030 just to keep with the pace of global economy. For organizations in the construction industry, that translates into revenues and growth rates. The imperative to beat low productivities is manifest and needs action from organizations in the industry if they wanted to survive the new global world (Blanco, Janauskas, & Ribeirinho, 2016).

2.7 Organizational Structure and Design

Organizing a company involves structuring the working relationships between employees and departments to allow them to attain the company's goals effectively and efficiently. The term Organizational structure is defined in the management literature as "formal system of tasks and jobs reporting relationships that determine how employees utilize resources to achieve the organization's goals". Organizational design is also defined in the management literature as "the process by which management create a detailed type of

organizational structure and culture so a company can operate in the most effective and efficient manner" (Jones & George, 2016).

In general, organizations are structured in three different manners, according to (Jones & George, 2016):

1. Functional Structure
2. Divisional Structure
3. Matrix Structure

A **Functional Structure** is an organizational structure that is composed of different functional departments which the company requires, in order to perform services to clients or produce goods. The functional departments in this scheme involve groups of people from similar backgrounds and similar set of skills to perform their jobs. Several advantages come with adopting a functional structure, for example, people from the same department share their knowledge and can also learn from observing one another.

Moreover, it is easier for management to monitor and assess performance of those in the department. Also, it is easier for the management to benchmark functions in the department to compare them with practices that are done in the competitive environment and acquire information about how they are changing. However, a number of issues can be faced by functional structures especially when organizations try to have broader set of services provided to their customers, or in the case of changes on the organizational structure level.

A **Divisional Structure** is mainly adopted when growth and diversification have increased over the lifetime of the organization to overcome the issues that come with a functional type of structure. In a divisional structure scheme, the organization is divided into multiple

series of business units that operate on their own to deliver a certain project, product or service. Each division encompasses a set of functional departments that operate together in order to deliver a certain project. The divisional structure arrangement makes it easier for management to control and manage their business units as it is the main goal for adopting a divisional structure.

Matrix Structure is well known to be the most flexible among the other three types of organizational structures. Even though the divisional structure is adopted as a response for changes and specific circumstances, it fails to perform well when IT and customers' requirements are changing rapidly. Matrix structures provide more flexibility and better performance under the shadow of a rapid and dynamic environment.

Mainly in a matrix structure, management superimposes functional and divisional structures. Employees and resources are grouped into two main categories: functions and projects. Employees in the functions category work with employees from the projects to deliver a certain project or a service. The result of this scheme makes up a complex network of reporting relationships that makes the organization very flexible and responsive. Employees in the matrix report to two bosses: a functional boss who assess their performance from a functional perspective and a project manager who assess their participation in teamwork.

To keep the matrix structure responsive and flexible, project and functional teams are empowered for making most of the significant decisions involved in the project delivery. The project managers keep track by monitoring financial resources and trying to retain the

project to its budget and time frame. The functional managers on the other hand ensure the quality of the project to get it as best it can be (Jones & George, 2016).

2.8 Summary

The concept of Business Process Reengineering dates back to the early 19th century with the birth of scientific management. However, the term BPR was fully developed and addressed in 1990 by Michael Hammer. Adopting a Business Process Reengineering strategy has been regarded as a significant solution for radical improvements in an organization. However, the associated high risks with initiating BPR make organizations consider all aspects to its implementation. Business Process Reengineering entails radical changes to an organization's processes, in order to enhance contemporary performance measures such as quality, cost, service and speed.

With the major changes the kingdom is facing, the Saudi construction organizations are forced to adapt to the current market demand, new governmental regulations and the fierce competition that comes alongside with them. Therefore, the need to redesign and reengineer the business model of the Saudi construction industry becomes manifest. In order to insure healthy reengineering and radical changes, assessing the readiness to adopt change management techniques becomes the first step in insuring a solid change. In particular, BPR readiness is assessed in the Saudi construction market through its critical success factors, they are leadership style, management commitment, organizational structure and information technology.

CHAPTER 3

Research Methodology

In this chapter, the means at which the objectives of this research are carried out will be explained as described in the following several steps:

1. Exhaustive review of literature related to the subject of BPR to build a basis from previous research.
2. Studying the critical success factors of BPR implementation and mapping them with construction organizations core processes.
3. Developing core processes of a typical construction organization that works for the Saudi construction industry as a whole.
4. Developing two survey questionnaires, the first one is based on the selected CSF to assess the readiness, and the second one discusses other BPR constituents for exploring perceptions and attitudes of the industry professionals.
5. Distributing the surveys to the targeted industry professionals.
6. Collecting the responses and analyzing them through statistical methods.
7. Providing a conclusion that is drawn out from the results.
8. Drawing out recommendations based on the results for future improvements.

3.1 Development of the Readiness Assessment Tool

Figure 2. lists the core processes of a typical construction organization, against them lays the critical success factors of BPR and its metrics to implementation. The core processes

are identified in an initial sketch. The consideration of this typical organization is to generalize on the whole of the Saudi construction industry, encompassing almost all supposed processes of a particular organization within the industry.

The core processes are further investigated in accordance with the available literature such as (Fisk & Reynolds, 2014) and other industry professionals who were consulted to identify the functional departments of a typical contractor in the Saudi construction industry through focus groups and semi-structured interviews. It is found that a typical contractor organization has a functional structure which is explained thoroughly in the literature review section.

The main departments in a functional structure involve: Finance Department, HR Department, Administration Department, Purchasing Department and Inventory control & Logistics Department (Jones & George, 2016). The remaining departments are what distinguish industries from one to another. In construction organizations, there exist two core processes that apply to all of the contractors, they are: Projects and Bidding & Tendering. In this research "Project" refers to the life cycle of a project which includes: initiation, planning, execution, monitoring and control, and commissioning. The other function is the "Bidding & Tendering" which involves tasks such as preliminary cost estimation, preliminary plans, preparing bid proposal and marketing (Fisk & Reynolds, 2014).

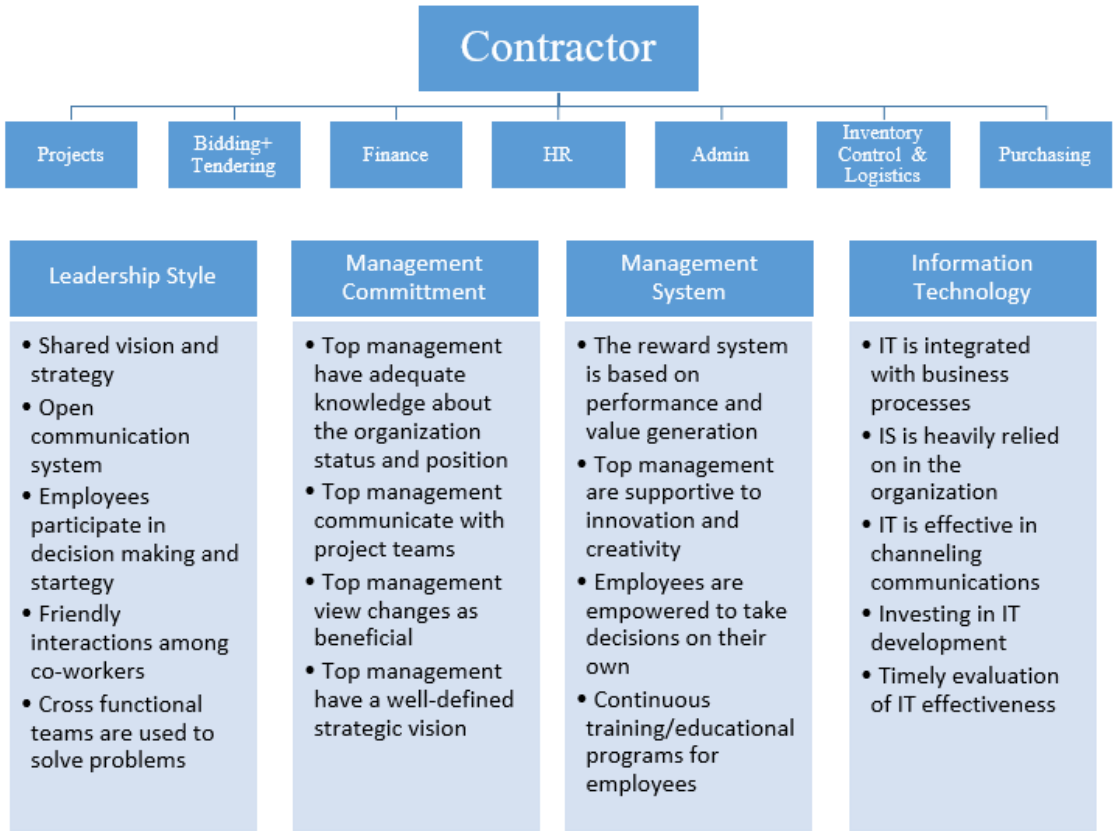

Figure 2: Core Processes vs. CSF's of BPR

3.1.1 Questionnaire Design

The survey used includes two main parts. The first part of the survey includes some demographic questions about the respondents' educational background, experience and job position as well as the firm's financial capacity. Part two of the survey will deal with the main subject which is assessing the readiness. At the start of part two, respondents will be asked to prioritize the core processes on the basis of the importance to apply changes to these processes. Then they are asked questions regarding the critical success factors implementation in each of the identified core process of a typical construction organization. Table 3 depicts part 2 of the survey questionnaire that deals with assessing the readiness to BPR implementation.

Table 2: Survey questionnaire dealing with assessing the readiness

		Core Processes						
	Organizational Practices	**Projects**	**Bidding &Tendering**	**Finance**	**HR**	**Admin.**	**Inventory Control & Logistics**	**Purchasing**
	Insert a rank for each core process							
#	**A. Information Technology**							
1	Information technology is integrated with all business processes of the organization							
2	The organization heavily rely on using the information system							
3	The IT infrastructure is efficient in channeling communications							
4	The company invest a percentage of the revenues in IT development							
5	The company evaluates the IT effectiveness frequently							
#	**B. Management Commitment**							
1	The top management have adequate knowledge about the organization status							
2	Top management communicates with project teams frequently							
3	Ensuring that resources needed for the quality management system are available							
4	Top management have a well-defined strategic vision							

5	Taking accountability for the quality management system effectiveness							
#	**C. Management System and Organizational Structure**							
1	The reward system is based on performance and generating value rather than working hours							
2	Top management support innovation and creativity							
3	The employees are empowered to make decisions (less bureaucracy)							
4	There are continuous training/educational programs to update employees' skills							
#	**D. Leadership Style**							
1	Top management share vision and strategy of the company with the employees							
2	There is an open communication between employees and top management							
3	Employees are involved in strategy making and thinking							
4	There are friendly interactions between co-workers							
5	Cross functional teams are a typical way in solving problems							
6	Ensuring that the quality management system achieves its results							

3.1.2 Pilot Study

A preliminary survey questionnaire is piloted among several practitioners in the Saudi construction industry with more than 20 years of experiences and academicians with focus on construction management related research. The main reason behind piloting the survey questionnaire is to include an input on the developed approach and in specific the identified core processes. The pilot study also includes the input of the participants (academicians and practitioners) through semi-structured interviews and focus groups. Lastly, the pilot study is conducted to record the time in which the participants can fill the survey, in order to design a more time effective and comprehensive questionnaire.

3.2 Development of "Perceptions and Attitudes" Questions

Developing the questions related to perceptions and attitude required an exhaustive literature review regarding the subject of BPR. The comprehensive literature review touches on areas such as critical success factors to BPR implementations, pitfalls and barriers of BPR programs, practices and experiences of previously executed BPR projects. All of which contribute to the development of the survey questionnaire and the questions for the semi-structured interviews.

The survey questionnaire is divided into two main parts, perceptions and attitudes. The perceptions section asks about the respondents' perspectives on the major constituents of business process reengineering which include information technology, leadership style, management commitment, effective communication, reward system, organizational structure, the competency level of employees in the Saudi construction industry and lastly

to define business process reengineering based on the input they got from the questionnaire and the semi structured interview. Listed in Table 3 below are the questions from the perceptions section. Respondents are asked to choose one of three statements for each question about the constituents. Each statement holds a different approach to BPR constituents, with one being the appropriate approach and the other two answers being outside the scope of constituents that are associated with business process reengineering.

Table 3: Questions relating to the perceptions section

Questions (Perceptions)
- *How does an effective "Leadership" emanate in the construction organization?*
- *How does "management commitment" come into picture in the construction organization?*
- *What is the role of IT in construction organizations?*
- *What are the fit qualities of an effective communication system (Meetings, Reporting systems, Cross-functional communications... etc.)?*
- *What comprises a healthy organizational structure for organizations in the construction industry?*
- *What comprises a good reward system in construction organizations?*
- *How would you describe the employees' competency in general in the Saudi construction organizations?*
- *Based on what was explained during the interview, what is your view on the concept of BPR (Business Process Reengineering)?*

As for the second part which deals with the attitudes, respondents are mainly requested to answer about the employees' competencies and whether their jobs can be enlarged, enriched or both. Listed in Table 4 below are the related questions to employees' competencies.

Table 4: Questions relating to the attitudes section

Questions (Attitudes) **Do employees in construction organizations have the adequate competency to;**
- *Job Enlargement: Increasing the number of different tasks in a given job*
- *Job Enrichment: Increasing the degree of responsibility an employee has over the job*

Following the two questions about job enlargement and job enrichment. Several trades within core processes of a typical construction organization are listed to ask about the applicability of either job enlargement, job enrichment, both or neither of the two. The respondents are asked about each trade included in the identified core processes and requested to include any addition to the list that was already prepared in the survey questionnaire. The identified core processes and trades are based on an initial sketch to encompass the Saudi construction organizations as a whole. The core processes include projects, bidding and tendering, finance, HR, administration, inventory control and logistics, and finally purchasing. The identified core processes and associated trades give a general indication on the attitudes of the industry professionals to improve the jobs and tasks of the employees within their organizations. Listed in Table 5 are the core processes with their associated trades.

Table 5: Core Processes with the associated trades

Projects					
Site Engineers	*Laborer*	*Steel Fixer*	*Welder*	*Survey Leveler*	*Concreter*
Site Supervisory Staff	*Operator*	*Plasterer*	*Carpenter*	*Electrician*	*Material Expediter*

Bidding & Tendering		
Preliminary Scheduling	*Preliminary Estimation*	*Marketing Teams*
Finance		
Cash flow management	*Project financing teams*	*Accounting Department*
HR		
Training and Development	*Employees Acquisition*	
Admin.		
Government Relations	*Public Relations*	
Inventory Control & logistics		
Logistics (construction logistics plan, waste disposal teams...etc.)	*Machinery Maintenance*	*Plants/Equipment related employees*
Purchasing		
Sourcing teams (suppliers, machinery, warehouses)	*Procurement Department*	

Following to the questions related to enlarging and enriching the trades within core processes, respondents are requested to include their thoughts on the expected benefits of applying business process reengineering in the Saudi construction organizations as well as expressing their opinions on the ability and acceptance of those organizations to adopt such initiative. Lastly, the respondents are asked to specify how BPR should be approached in the Saudi construction organizations and whether it should be radical or gradual change. Listed in Table 6 are the ending questions to the attitudes section.

Table 6: Questions related to the attitudes section

Questions (Attitudes)
Do you think that employees' engagement and top management commitment in construction organizations are important improvement factors
Do you think that utilizing new technologies and IT systems can add to the overall performance of the organization
Do you think that the leadership style in the construction organizations can affect the performance
Do you think that a healthy organizational structure and reward system can have a positive impact on the organization
Do you think that there is a need for improvement in the Saudi Construction Industry
Do you think that construction organizations are able to adopt management improvement tools to advance their processes
Do you think that those improvement tools will receive acceptance and have positive impacts in construction organizations
How do you think improvements to the organization through BPR should be approached in the Saudi construction industry?

3.3 Data Collection

The data intended for this research is collected by distributing the two survey questionnaires on the targeted industry practitioners. The questionnaires will be delivered to the respondents through e-mail or by hand if needed.

3.3.1 Population and Sampling

The targeted population that is going to be included has been determined to be all of Grade 1 contractors in the Eastern Province and they are 22 contractors in total according to the Ministry of Municipal and Rural Affairs (Contractors Classification Agency, 2016). To

obtain an effective sample size, Kish's formula will be used in the calculation as elaborated in the following (Kish, 1965):

$$n_0 = \frac{pq}{SEM^2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots eq1$$

$$n = \frac{n_0}{1 + \frac{n_0}{N}} \ldots\ldots\ldots\ldots\ldots\ldots . eq2$$

Where:

$n_0 = the\ first\ sample\ size\ estimation$

$p = proportion\ of\ the\ characteristics\ that\ are\ being\ measured$

$q = 1 - p$

$n = the\ final\ estimate\ of\ the\ sample\ size$

$N = the\ targeted\ sample\ size$

$SEM = maximum\ percentage\ of\ standards\ error$

$allowed\ for\ the\ sample\ mean$

Starting at eq1. by substituting p with 0.5, q will equal to 0.5 and assuming SEM = 10%, a value of 25 will equal n_0 which is the first estimate of the sample size. Substituting the results into eq2. will give a final estimated sample size of approximately 12 contractors. However, the population of such sample is considerably small and the surveys will be distributed for the whole original population of the 22 contractors. More surveys will be

distributed if more validation is required. Listed in Table 7 are the population, the effective sample size and the actual number of surveyed responses.

Table 7: Population and effective sample size

Population (Contractors Gr.1)	Effective Sample Size	Actual Number of Surveyed Responses
22	12	31

Respondents involved in this study are mainly from the top management or people directly reporting to the top management, with percentages of 35% and 65% respectively. The sample comprises respondents with different years of experience related to the construction industry, 26% of the respondents have more than 30 years of experience, 23% falling between 20-30, 38% falling between 10-20 and 13% between 5-10. See Figures 3 and 4 for more elaboration.

Figure 3: Categories of respondents

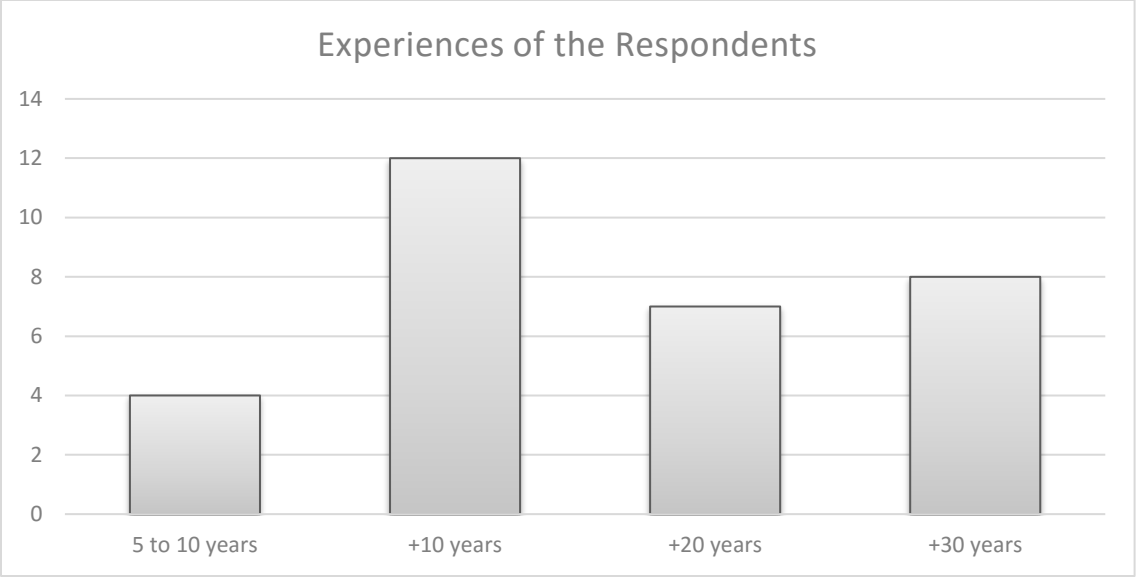

Figure 4: Experiences of the respondents

3.3.2 Data Collection Approaches

The primary method in distributing the two survey questionnaires is ought to be through interviewing the respondents in order for them to be briefed about the subject of BPR and the procedure they should follow in filling the surveys. During the conducted interviews, respondents are briefed about the constituents of BPR and then asked to answer each survey questionnaire separately.

Interviewing participants is extremely significant because in the first survey questionnaire, respondents are asked to answer the questions pertaining to current practices in their organizations. While in the second survey, respondents are asked to provide their perceptions about the subject of BPR. This results in what is identified in this research as "assessing the readiness", and "exploring the perceptions and attitudes" of the Saudi construction industry with regards to BPR.

Responses to the survey questionnaires are attained through two approaches, the first one includes that the surveys are manually answered, and the second one includes that the surveys are completed through online platforms or email. Listed in Table 8 are the two approaches with the number of responses obtained by each one of them.

Table 8: Data collection approaches

METHOD	TOTAL	RESPONDED
E-MAIL AND ONLINE PLATFORMS	15	10
INTERVIEW	21	21

Interviews are also conducted with respondents who answered through email and the online platform. Not to answer manually during the interviews is the choice of the respondents, who required to be provided by an electronic copy of the survey questionnaire through email, or a link to an online platform in order to provide their responses to the survey questionnaires.

3.4 Data Analysis

By means of each survey questionnaire that discusses a dissimilar aspect with regards to BPR. The analysis approaches in this research differed with the differences in the survey questionnaires distributed among the participants. The data collected from the first survey questionnaire answers will be used in measuring the following:

1. Prioritizing core processes in the construction organization in terms of which is the most important to start changes with.
2. Evaluating the critical success factors to implementing a BPR initiative in the Saudi construction industry.
3. Mapping the CSF's with construction core processes.

The statistical means into which those measures will be achieved are by the following:

1. Assigning an importance index for each core process.
2. Likert scale type of questions for the CSF's subgroups which assigns an implementation index for critical success factor.
3. Utilizing the RII method to analyze the responses.
4. Evaluating the calculated relative importance indices by developing a measurement scale describing pertaining to the Saudi construction organizations.

The core processes will be analyzed and ranked using the Importance Index as it is evident to be used in other studies relating to construction management research (D.Holt, 2014) (Assaf, 1995). Further elaboration with regards to the analysis of the first survey questionnaire is provided in Chapter 4.

As for the collected data from the second survey questionnaire, it has been presumed to only go over descriptive statistics and in particular the frequencies of answers given for each question in the survey. Recommendations for improvements in different organizational dimensions are emphasized in view of the provided results. Further description is addressed in Chapter 5 explaining the analysis and results obtained from the second survey questionnaire.

CHAPTER 4

The Readiness of the Construction Industry to Change: An Assessment Through the Lens of Business Process Reengineering

The construction industry, in general, is subject to a turbulent business environment depending on the economic cycles. Yet, the construction companies' implementation of business process reengineering (BPR) and other change management techniques is still limited although it is needed to cope with such changes. This research develops a systematic approach to assess the construction companies' readiness to launch BPR initiative(s). It is widely known that radical BPR initiatives are prone to unexpected failures, hence, the suggested approach will alleviate the risks associated with BPR implementation. The readiness of organizations within the construction industry is assessed as a first step to insuring a healthy change, by exploring the elements for a successful BPR implementation against core processes of the construction organizations. In Saudi Arabia, with the economic downturn and declining oil prices, the construction organizations are forced to adapt to the current market demand, new governmental regulations and the fierce competition that comes alongside with them. Therefore, the need to redesign and reengineer the business model of the Saudi construction industry becomes manifest. The results of the research reveal a major lag in each of the proposed critical success factors,

starting with information technology, management system, leadership style and management commitment.

4.1 Introduction

Over the course of the past few decades, people in the construction industry have battled changes to their ways of doing business as well as to their organizations, while other similar industries had many successful change programs (Mohamed & Tucker, 1996). When talking about the construction industry, the concept of change is often neglected. Organizations in the construction industry have restricted themselves to certain technologies and processes, mainly because of the fear of evoking unwanted changes (Hayes et al., 1998).

However, Constant change is a reality that everyone is aware of, and no one is an exception to the process of change (Al-Sedairy, 2001). In the world of conducting business, the need to change is becoming increasingly apparent. As it goes parallel with retaining a competitive advantage in the market, as well as creating an adaptation in the organizations' technological, human resources and administrative aspects (Goksoy et al., 2012).

Changes in general are driven by increased competition, technological advancement and scarcity of resources, all of which exert pressure on organizations to adapt and survive. The proposition of change for any organization may seem expensive and difficult at the time it is needed, however, it may be the secret ingredient to success and for organizations to thrive. The existence of many large organizations in today's fast paced global market depends highly on how these organizations response to changes and become accustomed to them (Jones & George, 2016). It is the main mission of any organization to seamlessly

acclimatize against high levels of radicalness generated by modernization and globalization. In this modern and global market, companies that have endured challenges turned out to possess good change management practices (Al-Sedairy, 2001).

According to a global study done by Mckinsey&Compnay, the construction industry worldwide is lagging behind many other industries, specifically in the areas of productivity, technological advancement and financial returns as well as investing in R&D. The study also points out the fact that the construction industry came the second last with regards to digitization among a list of 22 different industries (Agarwal et al., 2016). In another study conducted by the Mckinsey Global Institute, an estimated $57 trillion dollars' worth of investment in infrastructure will be required by the year of 2030 just to keep pace with the global demand. For construction organizations, this should translate into more revenue generation and growth rates. The imperative for those organizations to beat low productivities and lagging processes is clear as day and organizations need to take action if they sought to survive the new direction of this global world (Blanco et al., 2016).

That being said, the construction organizations in Saudi Arabia are very much included in the battle of business survival. The area of Business Process Reengineering or change management has been merely explored within the medium of the Saudi construction sector, professionally or academically. The impacts of the global economic crisis and the declining oil prices will push construction companies to radically change their ways in doing business and their operations. This is where a model to assess readiness of those organizations is needed, and where the purpose of this research stems.

4.2 BPR vs. The Construction Industry

Business Process Reengineering is a radical and a revolutionary approach to redesign business processes in order to achieve dramatic improvements in major performance measures (Hammer & Champy, 1993). During 1990's, Business Process Reengineering was heavily adopted by many management consulting firms as a way to improve business processes and the first on the list when it came to strategic planning. Many organizations in the construction industry invested in different improvement techniques such as TQM, downsizing and restructuring, however, outcomes of these improvement tools did not pay off the investment (Abdul-Hadi et al., 2005). On the contrary, many scholars and researches believe that implementing a BPR strategy could result in dramatic and continuous developments (Abdolvand et al., 2008)

The implementation of a BPR initiative in construction organizations or even in other organizations within different industries is not an easy task per se. Certainly, the initiative needs assurance against failure risks or other factors that could hinder the BPR program. Furthermore, the approach that the BPR takes is fundamentally relevant to the nature of the construction industry (Betts & Wood-Happer, 1994). This relevance stems from BPR's premise to simplify complex processes, streamline the flow of information, integrate between different functions, eliminate rework, inventory buffers, and unnecessary checking and control (Hammer & Champy, 1993). The Saudi construction industry is plagued with ill-defined processes such as delayed schedules, disputes, rework and increased costs. Those mentioned are symptoms of broken up processes; and implementing

Business Process Reengineering to organizations in the industry could be the cure if properly approached (Abdul-Hadi et al., 2005).

4.2.1 A Glimpse on the Saudi Construction Industry

The construction industry in Saudi Arabia makes up a big share of its gross domestic product, also considered as one of the largest industries in the country with regards to the number of employees it hires and a major consumer of manufactured goods and services. Hence, the condition and efficiency of the construction industry play a pivotal role in the Saudi economy (Abdul-Hadi et al., 2005). The Saudi construction industry is relatively young compared to other developed markets, yet, it fundamentally involves the public and private sectors. The public sector comprises the governmental bodies that are responsible for national development and infrastructure projects, whereas the private sector pertains to construction organizations that are privately held, or as a subsidiary of a family corporation or a conglomerate.

The Kingdom had a boom in construction during the 1980's, when the country's profits from oil had supported the financial standing to build massive infrastructural development projects. However, the decline in oil prices during 1986 led to an economic slowdown all of the world, and for Saudi Arabia in particular, there was a suspension of the completion of some ongoing major infrastructure and development plans. There were issues in payments by the government and financial support. All of which led to more competition in the form of lowering profit margins and employees' wages (Al-Sedairy, 2001).

Comparably, Saudi Arabia is almost undergoing the same scenario that happened in the 1980's. Oil prices have been declining through 2015 and 2016, greatly affecting

construction and hampering its operations. Furthermore, several infrastructure projects have been extended or even postponed. However, the Kingdom is now heading in a new direction that promotes more privatization and participation from the private sector. In order for construction organizations to keep stride with the Kingdom's futuristic vision, they need to revamp their processes and their business models to fit with what was summarized in the Kingdom's National Transformation Plan (National Transformation Plan 2020, 2016).

4.2.2 Assessing the Readiness of BPR Through CSF's

Since organizations have little to do with external factors influencing their business, they can solicit changes from within and improve their processes to better react to changes (Hammer, 1990). Initiating a BPR program entails taking risks, as the results could deviate from what is predicted (Crowe et al., 2002). In general, a successful BPR initiative should take into consideration a holistic view on multiple organizational dimensions such as, IT infrastructure and technological advancement, structure of the organization, culture and resources. The combination of organizational dimensions that a BPR program can improve makes its implementation approach very essential. As a consequence, there is an added complexity to BPR execution that acquires a certain set of critical success factors to be evaluated, in order to insure an effective implementation and at the same time avoiding any pitfall (Al-Mashari et al., 2001).

Recent literature addressed that the first attempts to implement BPR were radical to a high degree, nevertheless, these implementations evolved to a softer process that included learnt lessons through successes and failures of previous programs (Ozcelik, 2010). In a related

study handling the issue of BPR pitfalls, 70% of respondents agreed that a solid BPR implementation requires the existence of several critical success factors in the organization (Boyle, 1995). Several researchers have assessed BPR readiness through a lens of grouped critical success factors. The most reoccurring in the literature were compiled in a study conducted by (Abdolvand et al., 2008), they are, egalitarian leadership style and collaborative work environment, commitment of the top management, management system and organizational structure, and the use of information technology. Those factors are associated with different sub-groups of their own.

4.2.2.1 Egalitarian Leadership Style

Egalitarian leadership style promotes a more collaborative work environment compared to other leadership styles. In an egalitarian leadership, value is generated through positive interactions between the management and employees, cooperative work environment, dynamic flow of information and empowering employees. Due to the democratic qualities that an egalitarian leadership scheme entails, it allows for a change to run smoothly in the organization with little resistance form the employees. These productive interactions between different chains of command in an organization makes it more adaptable to changes (Crowe et al., 2002).

There are of course several elements in an egalitarian style that can pave the road for a successful implementation of BPR, they are: shared vision between management and employees, open communication system, lower tier employees' ideas are used constructively, confidence and trust in lower tier employees to make decisions, cooperative environment that promotes teamwork and cross-functional teams interactions (Lee, 1995)

and (Jones & George, 2016), and finally ensuring that the quality management system achieves its results (Jones & George, 2016).

4.2.2.2 Top Management Commitment

Top management role in a BPR initiative is another importance success factor. Top managers are at a seamless position to influence their organization environment and the employees. Moreover, top managers who show commitment by their personal involvement in changing the organization are more likely to witness a successful BPR program (Paper & Chang, 2005). A well-defined strategic vision at the top of the organizational pyramid is essential for successful implementation. Executives should have a clear view on the current standing of the organization's processes, adequate data and information about the initiative that is going to be undertaken and a realistic prospect of BPR outcomes (Abdolvand et al., 2008). Moreover, top management should communicate with projects' teams and employees during the change process for continuous feedback and more importantly to provide any needed resources (Crowe et al., 2002).

4.2.2.3 Management System and Organizational Structure

Changes to the current management systems and organizational structure are highly important in a BPR program (Crowe et al., 2002). The human resources structure should be redesigned to foster easier information sharing and better decision making process. Moreover, employees should be aided in the conversion period to better adapt themselves to the newly adopted systems and environment (Abdolvand et al., 2008). Furthermore, the redesigned organizational structure should act as an enabler for innovation and creativity,

less bureaucratic processes and more participative ones (Ahmad et al., 2007). Another requirement at the top of a successful BPR implementation is the continuous learning and training of employees on the newly adopted systems and technologies. Lastly, to insure a healthy change to the organizational structure and management system, the reward system should go along with spirit of BPR. The reward system should be based on generating value rather basing it on worked hours and other traditional methods (Peppard & Fitzgeraild, 1997).

4.2.2.4 Use of Information Technology and Up to Date Technology

Over the course of IT development, it has become apparent that utilizing information technology is one the most effective methods to facilitate organization's processes redesign (Goksoy et al., 2012). Processes that are integrated with innovative and state of the art technologies will ensure successful reengineering program (Ahmad et al., 2007). Moreover, several scholars have viewed IT utilization as an enabler to BPR implementation to stress its significance (Davenport & Sbort, 1990) and (Chan & Choi, 1997). Nowadays in particular, information technology can cover so many areas in an organization, to the point that if an effective IT infrastructure existed, it will directly bring success to other critical success factors by tugging human, organization and business processes altogether (Abdolvand et al., 2008).

Constituents of an effective IT infrastructure have been widely explored by many researchers and practitioners. Among those constituents are, investing in IT development, sufficient assessment of IT effectiveness, reengineering of legacy information systems and effective use of newly adopted information technology tools (Al-Mashari & Zairi, 1999).

4.3 Objectives of the Study

The main objectives of this research are: (1) Ranking core processes of the construction industry on the basis of priority to apply changes to them, (2) Evaluating critical success factors for BPR implementation pertaining the Saudi construction industry and (3) Developing a readiness assessment tool for construction organizations. This tool is demonstrated in Saudi Arabia, however, the tool can be utilized in different parts of the world. Figure 5 depicts a diagram in which the objectives will be met.

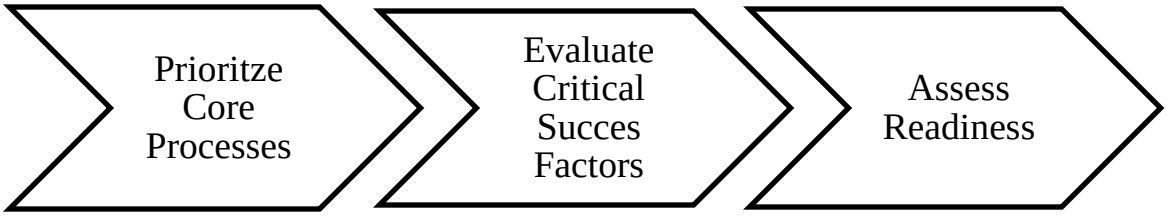

Figure 5: Objectives of the study

4.4 Research Methodology

The study objectives required identifying the various critical success factors to implementing a BPR initiative. An exhaustive literature review is conducted for the purpose of identifying relevant studies. The intensive literature review addresses four main factors along with their sub-factors as shown in Figure 6. The critical success factors are measured against the core processes of a typical construction organization.

The development of the core processes in the model is a product of an initial sketch made on a typical construction organization (see Figure 6). The consideration of this typical organization is to generalize on the whole of the Saudi construction industry, encompassing

almost all supposed processes of a particular organization within the industry. The identified core processes are gathered from the literature (Fisk & Reynolds, 2014; Jones & George, 2016). The input of construction practitioners and academicians in identifying the core processes is also collected through focus groups and semi-structured interviews. The methodology is developed over different phases that include: questionnaire design, and pilot study before the full-fledged implementation.

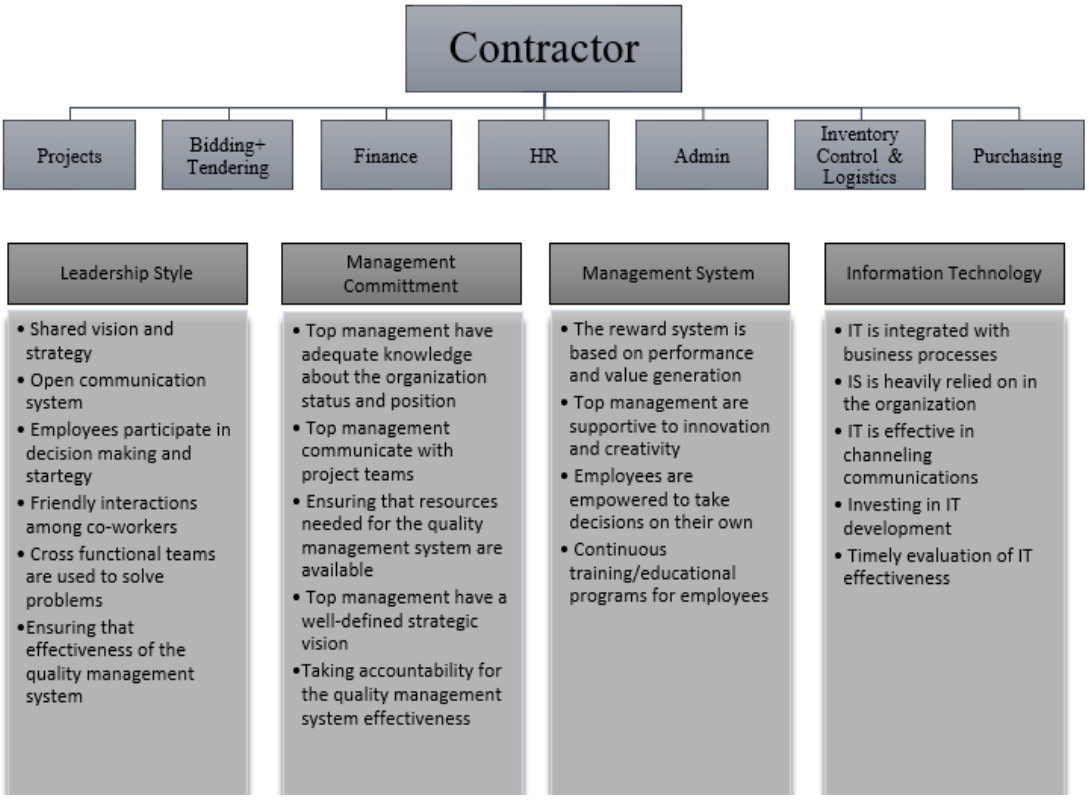

Figure 6: Core Processes vs. Critical Success Factors

4.4.1 Questionnaire Design

A survey questionnaire approach is considered to collect data about construction organizations. As mentioned, critical success factors to BPR implementation are measured

against core processes of a typical construction firm. Respondents are firstly asked to prioritize core processes with regards to the importance of applying changes to them, then they are asked to rank the implementation of the critical success factors against each core process. In order to assess the readiness of those organizations, the critical success factors in the survey questionnaire are expressed as practices in the organization and respondents answered about their ranks accordingly. Recommendations for improvements in different organizational dimensions are emphasized in view of the results of the study.

4.4.2 Pilot Study

A survey questionnaire is piloted among different experienced practitioners with more than 20 years of experience and academicians with construction research focus to provide input on the developed approach and to assess the proposed core processes in the scheme. The pilot study also includes the input of research participants (practitioners and academicians) through focus groups and semi-structured interviews. Lastly, the pilot study is conducted to record the required time frame to fill the survey questionnaire, in order to design a more time effective and inclusive questionnaire.

4.5 Theory and Calculations

The systematic approach followed in this research required ranking of the core processes in the construction organizations as well as the critical success factors in each core process. Two separate indices are developed to reflect the rankings specified by the respondents, and a third index (Readiness Index) is developed to act as a function for both indices,

reflecting the importance of a specific core process and the critical success factors implementation within that specific core process.

4.5.1 Data Collection

The survey questionnaire is distributed among Grade A building contractors (total of 31 companies) in the eastern province of Saudi Arabia. Information about the contractors are obtained from Chamber of Commerce (COC, 2016) and from the lists of contractors provided by the Ministry of Municipal and Rural Affairs (Contractors Classification Agency, 2016). Respondents are mainly from the top management or people directly reporting to top management. The selection of Grade A contractors is based on the assumption that large and well-established organizations are more capable to undertake a BPR initiative (Abdul-Hadi et al., 2005; Abdolvand et al., 2008).

4.5.2 Data Analysis

The data collected are analyzed through the following statistical means and indices;

Importance Index: Formula (1) cited by (Holt, 2014) is used to rank the core processes according to the importance of applying changes to them as identified by the respondents.

Importance Index (Imprt. I.) (%) = $\frac{\sum W}{AN} \times 100$ …….. (1)

Where,

W = the sum of "n" respondents selecting a specific rank (ranges from 1 for strongly disagree to 5 for strongly agree) multiplied by the rank's integer value.

A = largest rank that can be designated for a specific variable

N = Overall sample size (31 respondents)

Implementation Index: Formula (2) cited by (Holt, 2014) is used to independently rank the critical success factors implementation in each core process as indicated by the respondents.

Implementation Index (Impl. I.) (%) = $\frac{\sum W}{AN} \times 100$ …….. (2)

Where,

W = the sum of "n" respondents selecting a specific rank (ranges from 1 for strongly disagree to 5 for strongly agree) multiplied by the rank's integer value.

A = largest rank that can be designated for a specific variable

N = Overall sample size (31 respondents)

Readiness Index: The Readiness Index is calculated as a function of both the importance and implementation indices, as follows;

Readiness Index (R.I.) (%) = [Imprt. I. (%) * Impl. I. (%)]/100 …….. (3)

4.5.3 Evaluating Readiness

A scale of (Excellent, Satisfactory, not satisfactory and Deficient) is used to indicate the level of readiness according to the results obtained from the readiness indices.

1. [$0.801 \leq$ L.R.I ≤ 1.00] Indicates Excellent results.
2. [$0.701 \leq$ L.R.I ≤ 0.80] Indicates results that are satisfactory.

3. [0.601 ≤ L.R.I ≤ 0.70] Indicates that improvements are needed.
4. [0.00 ≤ L.R.I ≤ 0.60] Indicates deficiencies.

4.6 Results

4.6.1 Ranking of Core Processes in the Saudi Construction Industry

The importance index is used to rank the core process from the view point of the respondents. Table 9 shows the list of the core processes with their corresponding ranks that are generated on the basis of priority to apply changes. The obtained answers resulted in ranking Projects as the first core process to be reengineered followed by Bidding and tendering, Finance, Purchasing, Human Resources, Inventory Control & Logistics and lastly Administration. Equation (1) is used to estimate each rank for the core processes.

Table 9: Core Processes Ranking

Core Processes	*Imprt.I*	*Imprt.I (%)*	*Ranking*
1. Projects	0.955	95.5	1
2. Bidding & Tendering	0.845	84.5	2
3. Finance	0.826	82.6	3
4. HR	0.748	74.8	5
5. Admin.	0.671	67.1	7
6. Inventory Control & Logistics	0.697	69.7	6
7. Purchasing	0.781	78.1	4

The obtained rankings come as no surprise, due to the fact that the construction is a project driven industry. Hence, the respondents ranked projects as the first process to be

reengineered reflecting its importance to their businesses. Then bidding and tendering come in the second place stressing its value generation and its significance in winning new projects and contracts. Thirdly is the finance, indicating that it is a crucial process in the industry due to a number of factors including the industry's sensitivity to economic cycles, managing cash flows and handling challenges facing contractors to retain their credit rating and reputation as well as their competitive advantage. The remaining core processes are viewed as support processes that help in attaining specific desired objectives. Consequently, their rankings emanated from their value adding to mainly projects and then the organization as a whole.

4.6.2 Ranking of Critical Success Factors to BPR Implementation

The critical success factors of BPR implementation are expressed as a practice in the organization and then ranked accordingly. Table 10 summarizes the rankings given for the critical success factors by the 31 respondents, in which the ranks are estimated using equation (2).

Table 10: Ranking of critical success factors

	Implementation Indices						
Critical Success Factors	***Projects***	***Bidding &Tendering***	***Finance***	***HR***	***Admin.***	***Inventory Control & Logistics***	***Purchasing***
IT							
1. Information technology is integrated with all business processes of the organization	0.729	0.761	0.806	0.703	0.697	0.806	0.774
2. The organization heavily rely on using the information system	0.690	0.677	0.755	0.619	0.619	0.723	0.735

3. The IT infrastructure is efficient in channeling communications	0.742	0.710	0.794	0.735	0.703	0.723	0.755
4. The company invest a percentage of the revenues in IT development	0.523	0.529	0.619	0.568	0.548	0.574	0.626
5. The company evaluates the IT effectiveness frequently	0.555	0.516	0.600	0.555	0.542	0.568	0.542
Management Commitment							
1. The top management have adequate knowledge about the organization status	0.832	0.845	0.852	0.755	0.768	0.703	0.742
2. Top management communicates with project teams frequently	0.787	0.768	0.787	0.690	0.684	0.652	0.742
3. Ensuring that resources needed for the quality management system are available	0.742	0.684	0.697	0.619	0.594	0.645	0.684
4. Top management have a well-defined strategic vision	0.794	0.781	0.742	0.690	0.710	0.671	0.742
5. Taking accountability for the quality management system effectiveness	0.748	0.710	0.703	0.677	0.652	0.639	0.703
Management System and Organizational Structure							
1. The reward system is based on performance and generating value rather than working hours	0.761	0.735	0.671	0.652	0.658	0.658	0.697
2. Top management support innovation and creativity	0.755	0.723	0.697	0.671	0.671	0.671	0.684

3. The employees are empowered to make decisions (less bureaucracy)	0.716	0.652	0.574	0.561	0.548	0.555	0.568
4. There are continuous training/educational programs to update employees' skills	0.594	0.555	0.542	0.523	0.497	0.523	0.542
Leadership Style							
1. Top management share vision and strategy of the company with the employees	0.665	0.645	0.665	0.619	0.581	0.600	0.619
2. There is an open communication between employees and top management	0.710	0.703	0.684	0.677	0.665	0.632	0.671
3. Employees are involved in strategy making and thinking	0.619	0.542	0.516	0.471	0.477	0.458	0.503
4. There are friendly interactions between co-workers	0.735	0.742	0.723	0.742	0.755	0.723	0.729
5. Cross functional teams are a typical way in solving problems	0.723	0.671	0.639	0.606	0.606	0.626	0.665
6. Ensuring that the quality management system achieves its results	0.761	0.684	0.697	0.645	0.619	0.639	0.684

4.6.3 Ranking of Readiness Indices

The readiness indices act as a function of both the importance indices of the core processes and the implementation indices of the critical success factors. Mainly reflecting the current practices and implementations of critical success factors in each core process in the organization. By examining each core process separately with the associated critical success factors, a comprehensive look on reengineering the construction industry is

established. The readiness indices are summarized in Table 11, and are calculated using Equation 3.

Table 11: Readiness Indices

	Readiness Indices						
Critical Success Factors	***Projects***	***Bidding &Tendering***	***Finance***	***HR***	***Admin.***	***Inventory Control & Logistics***	***Purchasing***
IT							
1. Information technology is integrated with all business processes of the organization	0.70	0.64	0.67	0.53	0.47	0.56	0.60
2. The organization heavily rely on using the information system	0.66	0.57	0.62	0.46	0.42	0.50	0.57
3. The IT infrastructure is efficient in channeling communications	0.71	0.60	0.66	0.55	0.47	0.50	0.59
4. The company invest a percentage of the revenues in IT development	0.50	0.45	0.51	0.42	0.37	0.40	0.49
5. The company evaluates the IT effectiveness frequently	0.53	0.44	0.50	0.42	0.36	0.40	0.42
Management Commitment							
1. The top management have adequate knowledge about the organization status	0.79	0.71	0.70	0.56	0.52	0.49	0.58
2. Top management communicates with project teams frequently	0.75	0.65	0.65	0.52	0.46	0.45	0.58
3. Ensuring that resources needed for the quality management system are available	0.71	0.58	0.46	0.58	0.40	0.45	0.53
4. Top management have a well-defined strategic vision	0.76	0.66	0.61	0.52	0.48	0.47	0.58

5. Taking accountability for the quality management system effectiveness	0.71	0.60	0.58	0.51	0.44	0.45	0.55
Management System and Organizational Structure							
1. The reward system is based on performance and generating value rather than working hours	0.73	0.62	0.55	0.49	0.44	0.46	0.54
2. Top management support innovation and creativity	0.72	0.61	0.58	0.50	0.45	0.47	0.53
3. The employees are empowered to make decisions (less bureaucracy)	0.68	0.55	0.47	0.42	0.37	0.39	0.44
4. There are continuous training/educational programs to update employees' skills	0.57	0.47	0.45	0.39	0.33	0.36	0.42
Leadership Style							
1. Top management share vision and strategy of the company with the employees	0.63	0.55	0.55	0.46	0.39	0.42	0.48
2. There is an open communication between employees and top management	0.68	0.59	0.56	0.51	0.45	0.44	0.52
3. Employees are involved in strategy making and thinking	0.59	0.46	0.43	0.35	0.32	0.32	0.39
4. There are friendly interactions between co-workers	0.70	0.63	0.60	0.56	0.51	0.50	0.57
5. Cross functional teams are a typical way in solving problems	0.69	0.57	0.53	0.45	0.41	0.44	0.52
6. Ensuring that the quality management system achieves its results	0.73	0.58	0.58	0.48	0.42	0.45	0.53

4.6.4 The Readiness Assessment Tool

In order to evaluate the level of readiness to implement Business Process Reengineering in the Saudi construction industry, the ranks of the readiness indices are gauged against the previously mentioned scale (Excellent, Satisfactory, Needs Improvement and Deficient). Table 12 depicts the assessment of the Saudi construction organizations' readiness for Business Process Reengineering. This detailed assessment of readiness is to gain more broad understanding of the current standing of the Saudi construction industry.

The weights given for the critical success factors in Table 12 are the output of averaging the readiness indices for each core process summarized in Table 11. The indices' averages with their ranges will be evaluated as they provide quite clear insights on the current practices in the Saudi construction industry. A more thorough assessment may be by going further and examining the ranks and their corresponding scores on the previously mentioned scale for each readiness index. Without loss of generality, similar approaches can be easily extended to the construction industry in different parts of the world, or even other industries by only adjusting the core processes.

	Core Processes						
Critical Success Factors	***Projects***	***Bidding &Tendering***	***Finance***	***HR***	***Admin.***	***Inventory Control & Logistics***	***Purchasing***
Information Technology	0.62 (range=0.21)	0.54 (range=0.21)	0.59 (range=0.17)	0.48 (range=0.13)	0.42 (range=0.13)	0.47 (range=0.17)	0.54 (range=0.18)
Readiness Evaluation	Needs Improvement	Deficient	Deficient	Deficient	Deficient	Deficient	Deficient
Management Commitment	0.75 (range=0.08)	0.64 (range=0.14)	0.60 (range=0.24)	0.54 (range=0.07)	0.46 (range=0.12)	0.46 (range=0.04)	0.56 (range=0.05)
Readiness Evaluation	Satisfactory	Needs Improvement	Deficient	Deficient	Deficient	Deficient	Deficient
Management System and Organizational Structure	0.67 (range=0.16)	0.56 (range=0.15)	0.51 (range=0.13)	0.45 (range=0.11)	0.40 (range=0.12)	0.42 (range=0.11)	0.49 (range=0.12)
Readiness Evaluation	Needs Improvement	Deficient	Deficient	Deficient	Deficient	Deficient	Deficient
Leadership Style	0.67 (range=0.14)	0.56 (range=0.17)	0.54 (range=0.17)	0.47 (range=0.21)	0.41 (range=0.19)	0.43 (range=0.18)	0.50 (range=0.18)
Readiness Evaluation	Need Improvement	Deficient	Deficient	Deficient	Deficient	Deficient	Deficient

According to the results in Table 12, the Saudi construction industry is mostly scoring "deficient" in each proposed critical success factor against each core process. This low ranking demonstrates a lack of understanding of what could be an added value for construction organizations and the little amount of investment that the Saudi construction organizations put in their processes, systems and people.

Firstly, the IT is only scoring a "Needs Improvement" score in the projects and "deficient" in all the other core processes. This indicates that management attention is only focused on the IT infrastructure in Projects while neglecting other core processes. The industry is still very poor with regards to adopting new technologies or updated IT software not to mention investing in it. Therefore, the readiness of the current practices in IT and technological advancements are at their minimum for reengineering.

With regards to the management commitment, the top management seems to be more involved in the Projects and Bidding & Tendering processes, harnessing the resources of the organization for their sake, scores given for those two processes are "satisfactory" and "Needs Improvement" respectively. However, this involvement appears to be less in all the other core processes, scoring "deficient" in all of them. Again this indicates that the top management in the Saudi construction organizations are more focused on what brings the organization more revenues while neglecting other processes that can add value to their organizations. In the area of management commitment, the Saudi construction organizations show some kind of readiness with regards to Projects and Bidding & Tendering, however, it is not the same case for the remaining processes.

As for the management system and organizational structure, there are no differences to the mentioned above. In the Projects, the management system scored “Needs Improvement” and “deficient” in the remaining core processes. Demonstrating that the management system is mainly to assess their number one core process. Yet the Saudi construction organizations fail to show total readiness in this specific area (management system and organizational structure). Lastly is the leadership style, where similar to the management system, the Projects scored “Needs Improvement” and “deficient” in the remaining core processes.

4.7 Discussion and Conclusion

Adopting a Business Process Reengineering (BPR) strategy has been regarded as a significant solution for radical improvements in many organizations. However, the associated high risks with initiating BPR make organizations consider all aspects to its implementation. BPR entails radical changes to an organization’s processes, in order to enhance contemporary performance measures such as quality, cost, service and speed. This research introduced a new approach to minimize the risks associated with implementing a BPR strategy in the Saudi construction industry, by measuring the construction firms’ readiness for adopting such radical changes.

The readiness of the Saudi construction industry to adopt Business Process Reengineering is discussed through a field survey, in which it studied the importance of the core business processes in the construction industry and the level of implementation of a set of critical success factors in each core process. 20 critical success factors are identified through a comprehensive literature review. The identified critical success factors are grouped into

four main categories, they are, information technology, management commitment, leadership style, and finally the management system and organizational structure. The readiness indices are calculated as a product of both importance and implementation indices.

In general, the obtained results have revealed that the Saudi construction industry is far away from being ready to adopt Business Process Reengineering. The industry shows a slowdown in implementing each proposed critical success factor in the organizations' core processes. Particularly, the slowdown appears to be in the areas of supporting creativity and innovation, technological advancement and integrating IT with their business processes, hierarchic and bureaucratic organizational structures and lastly the little involvement of employees in decision making and strategy thinking. The results also point out to the fact that organizations in the industry are less interested in investing in core processes other than their top three, Projects, Bidding & Tendering and Finance, while on the other hand, other core process can add value to the overall performance of those organizations.

4.7.1 General Recommendations

Assessing the readiness of organizations to adopt Business Process Reengineering can address several important strengths, weaknesses and potential risks and hence the level of readiness in the company. That is to say, as long as the organization is ready, a BPR strategy can be initiated. On the other hand, if the organization shows lack of readiness to implement BPR, then the program should be postponed in order to work first on the deficiencies in the company.

Upon the findings of this study and given the poor track record of the construction industry in creativity and innovation, investing in IT and new technologies, tools and approaches. The adopted mindset within the construction contractors has to be renewed. For the Saudi construction industry to do better, it is recommended to embrace the following essential guidelines and approaches:

- Investing in IT development and technological advancement, as the pace of those two has amplified in the last decade. Also, to evaluate the effectiveness of the current IT and IS infrastructures, especially in channeling communications. Moreover, trying to integrate the IT with all the business processes to insure more productive and effective work.
- Management need to have a change strategy plan to be well informed about the current standing and a clear insight on the core business processes. Additionally, the management needs to communicate more with projects' teams, insuring that the needed resources are available and to take accountability for failures in the quality management system.
- Making an egalitarian culture, where it is possible to democratically share information and for the employees to interact with the upper management as well as raising the confidence and creativity of employees by involving them in strategy thinking. Moreover, promoting collaboration between employees and adopting a multidisciplinary way in solving problems through cross functional teams. Also, ensuring the effectiveness of the quality management system, for example through employing KPI's (Key Performance Indicators).

- Including a reward system that promotes adding value, and to empower employees to make decisions in order for them to create value through their jobs. Also, continuous training for employees is another important point to insure a competent and a skilled organization, and finally to support innovation and creativity by giving employees the space to share new and creative ideas.

Finally, to include the previously mentioned recommendations in all core processes after prioritizing them. In other words, to start the BPR program on the process with the highest priority down to the least. It is important to include all business processes in the BPR program, as each core process is responsible to add value to the overall performance of the organization since it is not the job of only the revenues generating processes.

4.7.2 Recommendations for Future Research

Similar study can be done on different category of construction contractors, such as, transportation contractors, electrical works contractors and industrial works contractors. Also, a similar study can be done on a different industry or even a single organization where assessing the readiness to implement Business Process Reengineering is needed, by only adjusting the core processes to go along with a particular industry or an organization. A detailed study can build on the obtained results in this research to find out different means to implement Business Process Reengineering after assessing the readiness.

CHAPTER 5

Enhancing the business process reengineering perception in the construction industry: the case of Saudi Arabia

Business Process Reengineering (BPR) is a management improvement tool that entails radical changes to organizations' core processes, culture and legacy systems. BPR is heavily used among organizations in manufacturing and production as well as management consulting firms as a way to improve basic performance measures such as quality, time and cost. However, it is evident in the literature that BPR is not a widely spread concept in construction although it is known to be highly sensitive to economic cycles. This research aims to enhance the body of knowledge of BPR implementation in the construction industry. The research is conducted in Saudi Arabia by involving construction industry practitioners in a survey questionnaire and semi-structured interviews to gain an insight on their perceptions and attitudes toward the BPR constituents. This research is the first to shed the light on the concepts of job enlargement and enrichment which is used to be overlooked in similar type of BPR research pertaining to the construction industry. The findings of this research reveal a general acceptance and positivity toward business process reengineering constituents and a general tendency toward integrating IT with business functions and communications, developing flexible management systems, and encouraging and empowering employees to generate value through their jobs with more delegated authority.

5.1 Introduction

Multiple scholars and researchers have addressed the fierce competition and the turbulent business environment in this global market. Most of the published studies agree that survival of organizations highly depends on being adaptive to changes, providing improved quality and lower prices as well as offering newfangled services and products (Corporation, 1995; Davenport & Sbort, 1990; Hammer & Champy, 1993). Organizations are ought to change due to several motives that could be external i.e. aggressive market competition and economic downturns, or internal i.e. enhancing the quality management system and improving the legacy systems (Al-Mashari & Zairi, 2000).

In that regard, Business Process Reengineering is considered as a management improvement tool that involves fundamental and radical changes to the organizations' ways in doing business and to their existing processes. BPR requires that organizations start changing from within by improving their existing sturctures and processes in order to react better to external changes influencing their businesses (Hammer, 1990).

In the context of the construction industry, several scholars have stated their worries about the continuous decreasing performance of the construction industry and the lack of adopting new technologies or improving their tools and approaches. The construction industry shows a major sluggishness in areas such as utilizing effective managerial practices, lagging behind many other industries in digitization and adopting new technologies, projects' atmposheres are plagued with adversarial relationships, claims, rework and disrupted schedules, all of which exert pressure on construction organizations to change as also projects are becoming more complex far more than ever. (Abdul-Hadi et

al., 2005; Agarwal et al., 2016; Blanco et al., 2016). Regardless of some arguments stating that many projects have finished within budget and on schedule, it is still commonly alleged by industry professionals that estimated budget and plans do not necessarily reflect the actual or required cost and time. This assumption comes as no surprise because of the inherent inefficiency of the existing practices and methods used in the construction industry which inevitably leads to lack in performance (Mohamed & Tucker, 1996).

The competition among construction contractors has been mainly the same for decades, which could be summarized in the competitive bidding stage. In general, the lowest bidder with regards to construction costs is usually the criterion to win the contract. However, with the declining demand for construction, the concept of competition in the construction industry will change to a more sophisticated one, where efficiency, effectiveness and quality of the provided service are more involved. Attaining the previously mentioned standards will guarantee contractors a competitive edge in the market as well as the ability to survive the new market demands (Al-Sedairy, 2001).

The global spending on infrastructure projects is estimated by the Mckinsey Global Institute to be $57 trillion worth of investment (Blanco et al., 2016). The Saudi construction industry is no exception to this estimate. However, the Saudi construction organizations are now facing huge challenges with the fluctuating oil prices, new governmental regulations pertaining to privatization and more participation from the private sector and lastly clients shifting their demands with regards to the provided services (Al-Sedairy, 2001;National Transformation Plan 2020, 2016).

This research explores perceptions and attitudes from the Saudi construction industry toward constituents of BPR i.e. leadership style, management commitment, information technology, management system and organizational structure, and concepts such as job enlargement and job enrichment. In an attempt to enhance the body of knowledge in this area, all of which could lead to a better understanding of what comprises a healthy organization and an adaptive one.

5.2 Reviewing Business Process Reengineering

Although the concept of Business Process Reengineering originates back to theories developed in the early 19th century by the father of scientific management Fredrick Taylor, the term “BPR” was first introduced by Michael Hammer in 1990 in an article he authored for the Harvard Business Review (Im et al., 1999; Goksoy et al., 2012). Throughout the 1990's, two schools of thought had emerged concerning the subject of BPR. The first one known as the radical school, led by Hammer and Champy, where they defined BPR as “fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in contemporary performance measures such as cost, quality, service and speed”. The other famous school of thought was led by Davenport, known as the conservative school, where BPR was defined as “a revolutionary new approach that uses information technology and human resources management to dramatically improve business performance”. (Abdul-Hadi et al.,2005)

During the 1990’s, many large consulting firms had their touch on advancing the concept of BPR, and offered BPR as a package of their services portfolio. BPR was the number one initiative among other improvement tools that facilitate the achievement of strategic goals.

Furthermore, when other large companies in different industries noticed the successes that BPR could attain, they too sought after reconstructing previous programs for organizational change by adjusting to the means of this new approach for change (Abdul-Hadi et al., 2005; Biazzo, 1998).

According to the definition proposed by Hammer, business process reengineering advocates that changes to the organizations should be fundamental and radical, by going back to the principles and re-examining their very roots. Initiating a successful BPR program necessitates that people and technical skills are fully recognized in the organization. As changes is an inevitable fact for any organization, BPR has offered continual improvement contributions that facilitate parallel development for both aspects technological and business environment (Rahali et al., 2009; Ranganathan & Dhaliwal, 2001).

5.2.1 Key Constituents of Business Process Reengineering

Business process reengineering employ changes with regards to people pertaining to culture and behaviors, as well as changes to processes and technology (Al-Mashari et al., 2001). In its core, changes may not only affect organizational structure but also operating methods, style of management, the personnel's characteristics and the culture of the organization (Biazzo, 1998).

One significant constituent is information technology, where it performs an essential role in facilitating organizations' processes redesign (Goksoy et al., 2012; Wu, 2002; Wu, 2003). Information technology has been viewed by BPR researchers as an enabler to reengineering, since integrating it with processes will insure successful redesigned

procedures (Attaran, 2004; Davenport & Sbort, 1990). Appropriate alignment of IT with the organizations' processes and strategies involves building an effective IT infrastructure, by investing in IT development, measuring its effectiveness and efficiency in channeling communication and streamlining information. (Al-Mashari & Zairi, 1999).

Making changes through business process reengineering entails altering many of the principles and assumptions of management style and revising the nature of work performed by the employees. Business process reengineering takes into consideration the human side of change. To illustrate, it is intended in BPR programs that the jobs in an organization are oriented toward results and not only toward completing a set of tasks. A major constituent of business process reengineering is enlarging and enriching the jobs in which employees are involved in. Authority and responsibility should be distributed in a way that match the flow of activities and information, and where the middle management control is reduced and shifted to individuals, by developing an organizational design that nurtures united operating and decision making as well as empowering employees and team members. (Abdul-Hadi et al., 2005; Biazzo, 1998).

Committed management and leadership style are other constituents that are on the list of BPR success. The role of managers and the type of leadership in any organizational change are considered to be among the most important factors for success (Al-Mashari & Zairi, 1999). A designated champion for the change who motivates, empowers and promotes employees' involvement rather than directly guiding them, will insure a healthy BPR program for the organization. Moreover, a leadership style that encourages open communications between different chains of command and cooperative workplace will smoothen the process of change. As for the management commitment, it involves

continuous communications between senior management and projects' teams, assuring that the needed resources are adequate as well as having a well-defined strategic vision that is communicated to lower tier employees (Abdolvand et al., 2008; Sutcliffe, 1999).

For business process reengineering to be successful, the employees should be highly qualified, responsible and self-motivated. Management should provide continuous training and learning, in order to keep employees updated and at the peak of their competencies (Al-Mashari & Zairi, 1999; Peppard & Fitzgeraild, 1997). To smoothen up the change process through business process reengineering, organizations should have teams that are motivated and able to innovate new processes' designs as well as working to a mutual purpose that contributes to the success of the organization (Katzenbach & Smith, 1993). Lastly, to have a reward system that goes along with the spirit of business process reengineering by supporting value generation rather than a reward system that takes into consideration only the worked hours and overtime or other similar traditional methods of reward systems (Al-Mashari & Zairi, 1999; Peppard & Fitzgeraild, 1997).

5.2.2 The role of job enlargement and job enrichment in BPR

In this research the concept of job enlargement and job enrichment have been explored in depth more than other previous studies, although many of these studies stress the fact that BPR entails enriching and enlarging jobs within organizations (Biazzo, 1998; Paper & Chang, 2005; Al-Mashari & Zairi, 2000). The main objective of job enlargement and job enrichment is to create a division of labor in which more performance at higher levels is achieved.

Job Enlargement includes increasing the number of different tasks in a certain job. The main idea behind job enlargement is that increasing the range of the performed tasks will in return decrease the fatigue and boredom and may also encourage the employees to perform at higher levels. As for the **Job Enrichment**, it includes increasing the level of authority and responsibility an employee has over a specific job. Job enrichment can be achieved through, (1) empowering employees to invent and redesign new ways in doing their jobs, (2) supporting skills development of the employees through continuous training, (3) delegating authority for employees to take on decisions regarding their jobs and to respond to unexpected circumstances, and (4) empowering employees to measure and monitor their own performance. The main idea behind job enrichment is to involve employees more with their designated jobs and as a consequence increasing their attention to the quality of the service they provide or the goods they produce.

(Hackman & Oldham, 1980) both developed a job characteristics model that describes in details how managers can build job designs that are more motivating and interesting to employees. It describes several areas such as personal and organizational significances that will result from enlarging and enriching jobs. According to their model, every job has five dimensions that control the level of motivation in that specific job. These five characteristics can influence how employees respond to their designated work and lead to outcomes such as satisfaction and high performance as well as low absenteeism.

1. Skill variety: The degree to which a specific job requires that an employee has a variety of several diverse skills.
2. Identity of the task: The degree to which a specific job require that an employee should do all the necessary tasks to complete the job.

3. Significance of the task: The degree to which an employee feels that the job he/she is performing is affecting people within the organization such as coworkers or people outside the organization such as customers.
4. Level of autonomy: The degree to which a certain job gives an employee the freedom to take on decisions about scheduling different tasks and how to perform them.
5. Feedback: The degree of how actually performing a specific job provides an employee with direct and clear information about how effective and efficient he or she are performing (Jones & George, 2016; Hackman & Oldham, 1980).

Hackman and Oldham argue that the five dimensions proposed in the job characteristics model will have an effect on the employees' motivation, primarily through influencing three basic psychological states. The more employees sense that their jobs are meaningful, and they are responsible for the outcomes of the work and how well those outcomes be, the more motivated and satisfied the employees in doing their work as well as performing at higher levels (Jones & George, 2016). Figure 7 depicts the job characteristics model.

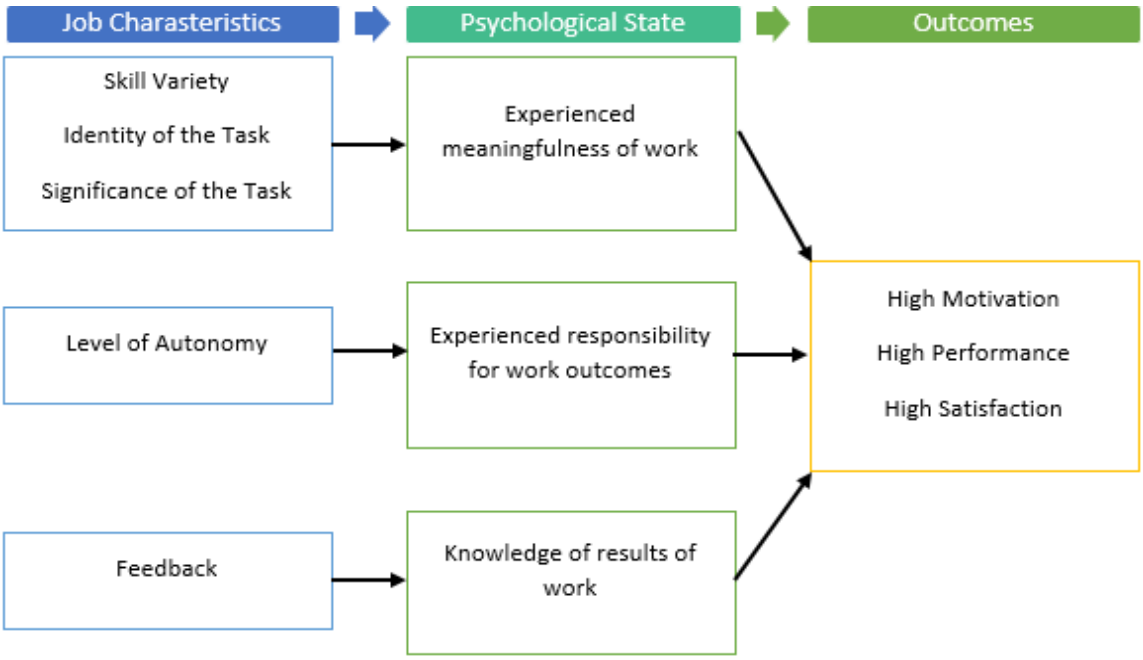

Figure 7: Job Characteristics Model

5.3 Research Methodology

The study objective required an exhaustive literature review regarding the subject of business process reengineering. The comprehensive literature review touches on areas such as critical success factors to BPR implementations, pitfalls and barriers of BPR programs, practices and experiences of previously executed BPR projects. All of which contribute to the development of the survey questionnaire and the questions for the semi-structured interviews.

5.3.1 Questionnaire Design

The survey questionnaire is divided into two main parts, perceptions and attitudes. The perceptions section asks about the respondents' perspectives on the major constituents of business process reengineering which include information technology, leadership style,

management commitment, effective communication, reward system, organizational structure, the competency level of employees in the Saudi construction industry and lastly to define business process reengineering based on the input they got from the questionnaire and the semi structured interview. Listed in Table 12 below are the questions from the perceptions section. Respondents are asked to choose one of three statements for each question about the constituents. Each statement holds a different approach to BPR constituents, with one being the appropriate approach and the other two answers being outside the scope of constituents that are associated with business process reengineering.

Table 12: Questions relating to the perceptions section

Questions (Perceptions)
- *How does an effective "Leadership" emanate in the construction organization?*
- *How does "management commitment" come into picture in the construction organization?*
- *What is the role of IT in construction organizations?*
- *What are the fit qualities of an effective communication system (Meetings, Reporting systems, Cross-functional communications... etc.)?*
- *What comprises a healthy organizational structure for organizations in the construction industry?*
- *What comprises a good reward system in construction organizations?*
- *How would you describe the employees' competency in general in the Saudi construction organizations?*
- *Based on what was explained during the interview, what is your view on the concept of BPR (Business Process Reengineering)?*

As for the second part which deals with the attitudes, respondents are mainly requested to answer about the employees' competencies and whether their jobs can be enlarged, enriched or both. Listed in Table 13 below are the related questions to employees' competencies.

Table 13: Questions relating to the attitude section

Questions (Attitudes)
Do employees in construction organizations have the adequate competency to;
- *Job Enlargement: Increasing the number of different tasks in a given job*
- *Job Enrichment: Increasing the degree of responsibility an employee has over the job*

Following the two questions about job enlargement and job enrichment. Several trades within core processes of a typical construction organization are listed to ask about the applicability of either job enlargement, job enrichment, both or neither of the two. The respondents are asked about each trade included in the identified core processes and requested to include any addition to the list that was already prepared in the survey questionnaire. The identified core processes and trades are based on an initial sketch to encompass the Saudi construction organizations as a whole. The core processes include projects, bidding and tendering, finance, HR, administration, inventory control and logistics, and finally purchasing. The identified core processes and associated trades give a general indication on the attitudes of the industry professionals to improve the jobs and tasks of the employees within their organizations. Listed in Table 14 are the core processes with their associated trades.

Table 14: Core processes with the associated trades

Projects					
Site Engineers	*Laborer*	*Steel Fixer*	*Welder*	*Survey Leveler*	*Concreter*
Site Supervisory Staff	*Operator*	*Plasterer*	*Carpenter*	*Electrician*	*Material Expediter*

Bidding & Tendering		
Preliminary Scheduling	*Preliminary Estimation*	*Marketing Teams*
Finance		
Cash flow management	*Project financing teams*	*Accounting Department*
HR		
Training and Development	*Employees Acquisition*	
Admin.		
Government Relations	*Public Relations*	
Inventory Control & logistics		
Logistics (construction logistics plan, waste disposal teams...etc.)	*Machinery Maintenance*	*Plants/Equipment related employees*
Purchasing		
Sourcing teams (suppliers, machinery, warehouses)	*Procurement Department*	

Following to the questions related to enlarging and enriching the trades within core processes, respondents are requested to include their thoughts on the expected benefits of applying business process reengineering in the Saudi construction organizations as well as expressing their opinions on the ability and acceptance of those organizations to adopt such initiative. Lastly, the respondents are asked to specify how BPR should be approached in the Saudi construction organizations and whether it should be radical or gradual change. Listed in Table 15 are the ending questions to the attitudes section.

Table 15: Questions relating to the attitude section

Questions (Attitudes)
Do you think that employees' engagement and top management commitment in construction organizations are important improvement factors
Do you think that utilizing new technologies and IT systems can add to the overall performance of the organization
Do you think that the leadership style in the construction organizations can affect the performance
Do you think that a healthy organizational structure and reward system can have a positive impact on the organization
Do you think that there is a need for improvement in the Saudi Construction Industry
Do you think that construction organizations are able to adopt management improvement tools to advance their processes
Do you think that those improvement tools will receive acceptance and have positive impacts in construction organizations
How do you think improvements to the organization through BPR should be approached in the Saudi construction industry?

5.3.2 Sample Selection

The survey questionnaire is distributed among Grade A contractors of the eastern province in Saudi Arabia (total of 31 companies). Details relating to the contractors are attained from Chamber of Commerce official website (COC, 2016) and from the listed categories of contractors provided by the Ministry of Municipal and Rural Affairs (Contractors Classification Agency, 2016). Selecting contractors from Grade "A" category is based on the assumption that large and well-established companies have more capabilities to undertake a BPR initiative and are more aware of the subject of BPR (Abdul-Hadi et al.,

2005; Abdolvand et al., 2008). Respondents are mainly from the top management (35%) and people directly reporting to top management (65%). The sample comprises respondents with different years of experience related to the construction industry, 26% of the respondents have more than 30 years of experience, 23% falling between 20 and 30, 38% falling between 10 and 20 and 13% between 5 and 10.

5.4 Analysis and Results

As mentioned earlier, the survey questionnaire is divided into two main parts, the first one discusses the perception of the respondents, while the second part discusses their attitudes.

5.4.1 Perceptions

Responses from this section show a modest understanding of the business process reengineering constituents. For the leadership, where respondents are asked to select the style that goes along with BPR, almost 55% answered egalitarian, 38% answered with authoritarian and 7% answered with Delegative style. With regards to management commitment, 45% of the respondents see that management commitment comes in the form of providing adequate resource and continuous involvement in improving internal functions of the organization, 42% see that management commitment is only achieved by a management that is committed to a strategic vision, and lastly 13 % see that management commitment is only done by frequent meetings with the employees.

As for the role of IT in the construction organizations, 58% of the respondents answered that IT should be integrated with all functions of the organization regardless of the means of integration, 23% see that IT has only to do with enterprise resource planning systems

and 19% see that the role of IT in construction organizations is only to support projects related software. In Regards to what could comprise an effective communication system, 55% see that an effective communication system should enable timely information and has a user friendly interface if done through IT, 23% responded that an effective communication system is mainly integrated with IT and 22% answered that effective communication only requires decent coordination.

With regards to organizational structure and the reward system, responses are mostly positive with almost 80% voting for a flexible system that delegates more authority for employees and team members, 17% see that construction organizations should have rigid and bureaucratic management systems while the last 3% voted for a full autonomy management system. As for the reward system, almost all the respondents go along with idea of basing the reward system on performance rather on the worked hours. As far as the employees' competencies in Saudi Arabia are concerned, 87% responded that employees in the Saudi construction industry are average employees, while the rest 13% answered that the employees have poor competencies and skills.

Lastly, for the question asking about defining business process reengineering, 55% of the respondents answered that BPR is only a tool that will help organizations in attaining a competitive advantage in the market, 42% see that BPR is a tool used to respond to changes by rethinking and redesigning business processes and 3% perceive that BPR is a way to lay off employees and downsize the organization in economic downturns.

5.4.2 Attitudes

Responses relating to the attitudes toward business process reengineering show highly positive attitudes with regards to the constituents of BPR. Respondents in this section are firstly asked to answer about whether the employees in the Saudi construction organizations have the adequate competency to job enlargement which includes increasing the number of different tasks in a given job and job enrichment which includes increasing the degree of responsibility an employee has over his job. For the question relating to job enlargement, 71% of the respondents provided positive feedback on the employees' ability to job enlargement, and the rest answered with the opposite. With regards to enrichment, almost the same percentages occurred, where 74% of the respondent see that employees in the Saudi construction industry have the adequate competency to enrich their jobs, and the remaining 26% responded with the total opposite.

Following the two questions about job enlargement and job enrichment. Several trades within core processes of a typical construction organization are listed to ask about the applicability of either job enlargement, job enrichment, both or neither of the two. The respondents are asked about each trade included in the identified core processes. The identified core processes and trades are based on an initial sketch to encompass the Saudi construction organizations as a whole, the core processes include projects, bidding and tendering, finance, HR, administration, inventory control and logistics, and finally purchasing. The identified core processes and associated trades give a general indication on the attitudes of the industry professionals to improve the jobs and tasks of the employees within their organizations, without going into deep details of each organization. See Tables

16 and 17 as well as Figures 8 and 9 for the answers provided for improving trades within the core processes.

Table 16: Answers for trades in Project and Bidding & Tendering

Projects and Bidding & Tendering	Job Enlrg.	Job Enrich.
Site Engineers	70.97%	83.87%
Site Supervisory Staff	58.06%	74.19%
Material Expediter	58.62%	55.17%
Laborer	66.67%	44.44%
Operator	51.85%	62.96%
Concreter	70.37%	44.44%
Steel Fixer	70.37%	40.74%
Plasterer	69.23%	46.15%
Electrician	70.37%	48.15%
Welder	69.23%	50.00%
Carpenter	70.37%	44.44%
Drain layer	61.54%	50.00%
Survey Leveler	74.07%	48.15%
Preliminary Scheduling	68.97%	75.86%
Preliminary Estimation	68.97%	79.31%
Marketing Teams	63.33%	73.33%

Table 17: Answers fort the remaining processes

Finance, HR, Admin, Inventory Control & Logistics and Purchasing	Job Enlrg.	Job Enrich.
Cash flow management	70.00%	76.67%
Project financing teams	60.00%	76.67%
Accounting Department	73.33%	66.67%
Training and Development	83.33%	56.67%
Employees Acquisition	65.52%	68.97%
Government Relation	66.67%	66.67%
Public Relations	58.62%	65.52%
Logistics Teams	66.67%	76.67%
Machinery, equipment control and maintenance teams	74.07%	62.96%
Plants/Equipment related employees	74.07%	55.56%
Resourcing teams (suppliers, machinery, warehouses)	73.08%	69.23%
Procurement Department	58.06%	90.32%

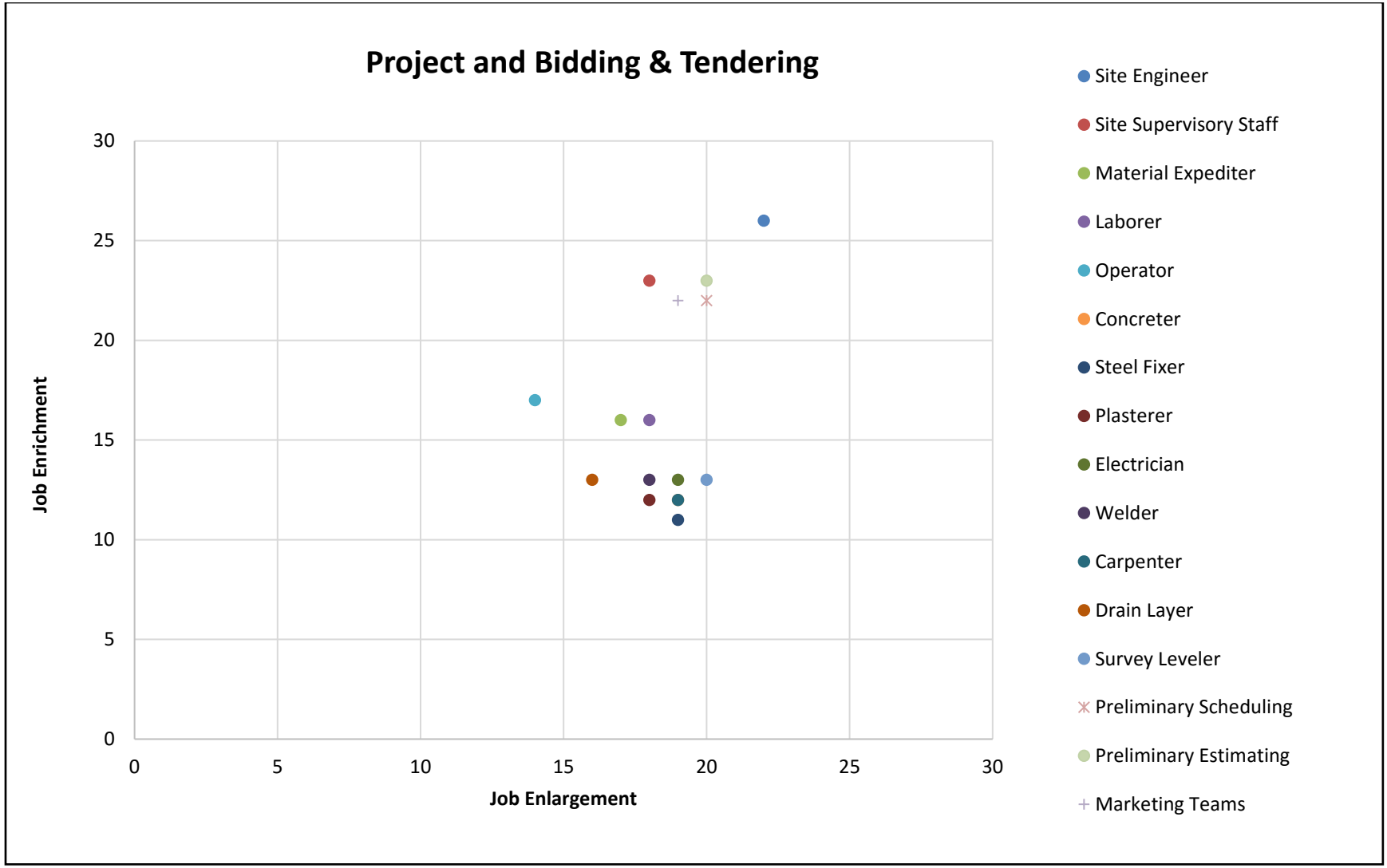

Figure 8: Answers about improving trades in projects and bidding & tendering

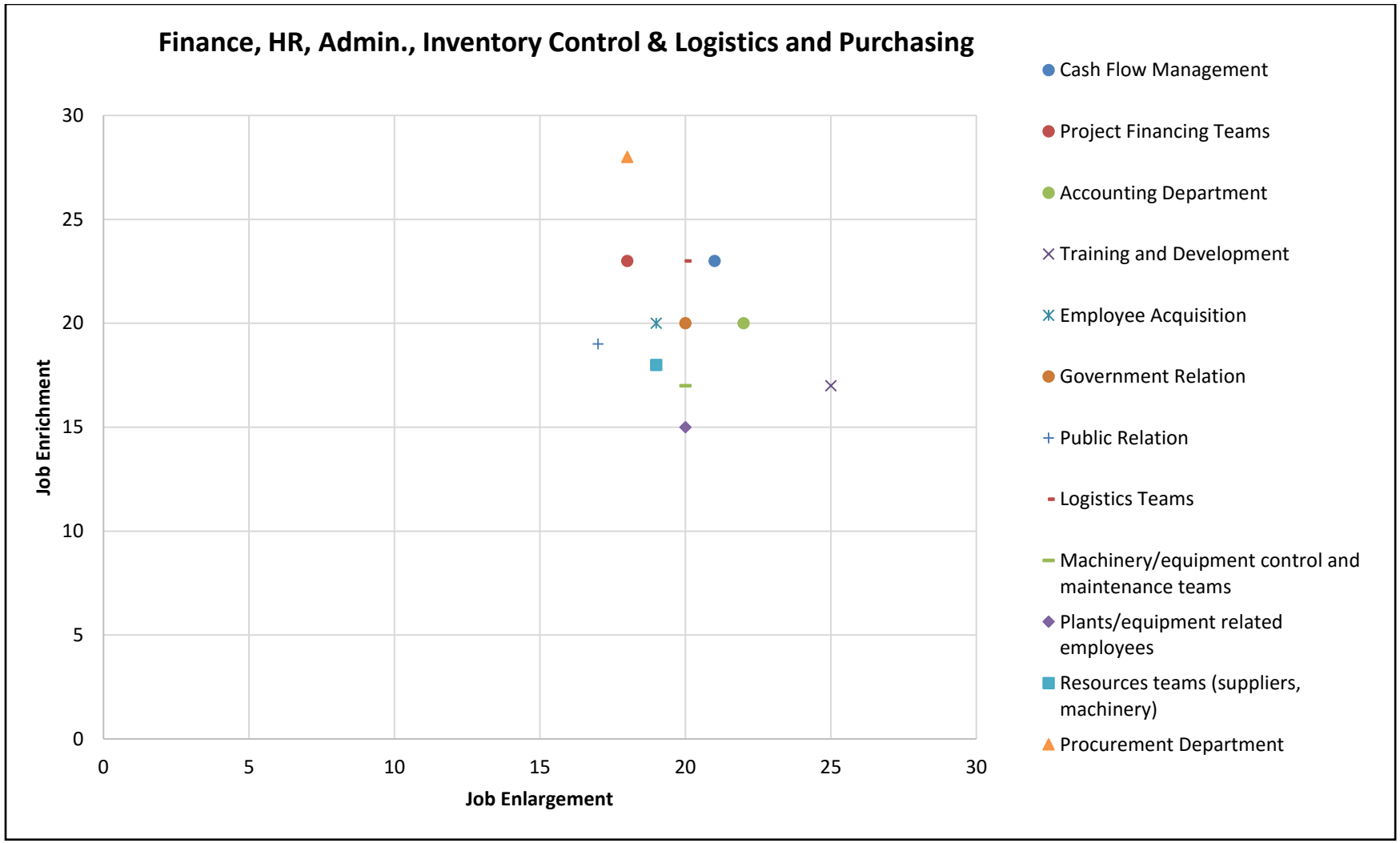

Figure 9: Answers about improving trades in Finance, HR, Admin, Inventory Control & Logistics and Purchasing

Following to the questions related to the attitudes about the trades in each core process, respondents answered about several general questions pertaining to the expected benefits and outcomes if BPR is to be applied within the Saudi construction organizations. See Table 18 for further illustration.

Table 18: Answers about the expected benefits of BPR

Questions	*Yes*	*No*
Do you think that employees' engagement and top management commitment in construction organizations are important improvement factors	100%	0%
Do you think that utilizing new technologies and IT systems can add to the overall performance of the organization	100%	0%
Do you think that the leadership style in the construction organizations can affect the performance	94%	6%
Do you think that a healthy organizational structure and reward system can have a positive impact on the organization	100%	0%
Do you think that there is a need for improvement in the Saudi Construction Industry	97%	3%
Do you think that construction organizations are able to adopt management improvement tools to advance their processes	84%	16%
Do you think that those improvement tools will receive acceptance and have positive impacts in construction organizations	70%	30%

As for the answers relating to how improvement through business process reengineering should be approached in the Saudi construction industry, the responses almost split in half, where 52 % answered that changes should be a top-down approach (radical), and 48% responded that changes should be approached in a bottom-up (gradual) manner.

5.5 Discussion

The answers to the survey questionnaire show a moderate understanding with regards to business process reengineering constituents. The mindsets in general within the Saudi construction organizations lean more toward flexible and value generating methods of working. Even though in reality and practice it could be different, yet the perceptions about what business process reengineering could offer are positive. These mindsets are manifested in the answerers provided in the perceptions section. The responses also reveal that there is some kind of tendency to integrating IT with all the business functions and with the communication systems. Nevertheless, the construction industry in practice is still among the least in digitization. The IT infrastructure in the Saudi construction organizations should be subjected to evaluations of effectiveness and continuous investing in order to cope with the technological advancements.

Furthermore, respondents show almost a unanimous answer about the competency of employees within construction organizations describing it as an average competency. This leads to the questions regarding the attitudes, and whether employees in the Saudi construction industry have the adequate competency to enlarge and enrich their jobs. Responses demonstrate a generally positive attitude toward job enlargement and job enrichment. Respondents also feel that incorporating these two concepts within their organizations could lead to better quality deliverables as employees will sense the value generation aspect in their jobs.

Managers in the Saudi construction industry can adopt the foregoing job characteristics model to insure a healthy job design and division of labor in which employees work with vast skill variety and with little control and more autonomy. Achieving what is mentioned in the job characteristics model entails a commitment from the management and investing in the people within those organizations by continuous training and adopting new and advanced technologies. Employees who experience meaningful work and have control and responsibility over their job are more likely to perform at higher levels and be motivated as well as satisfied with their work. Consequently, delivering higher quality service in less time and cost. In this regard, managers in the Saudi construction industry can follow few steps to guarantee better job designs and division of labor in which jobs are enlarged and enriched on the basis of the job characteristics and the psychological state. Figure 10 depicts the steps that manager in the Saudi construction organizations can follow in order to incorporate job enlargement and job enrichment in their organizations.

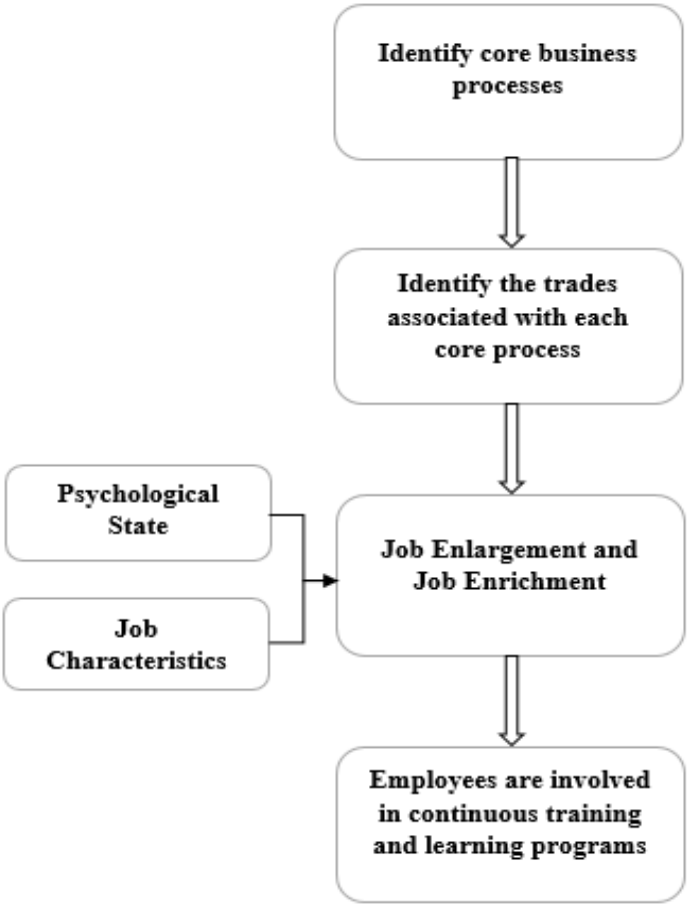

Figure 10: Steps to job enlargement and enrichment

In the last part of the survey questionnaire, respondents confirm that the Saudi construction industry is in need for reengineering and improvements to their systems, mindsets, processes and structures. The respondents also assure that the proposed constituents of business process reengineering are important improvement factors and investing in these constituents can revamp any organization. Nevertheless, there is a minor split in the attitudes with regards to accepting an initiative such as business process reengineering in the Saudi construction industry. This could be explained by the same arguments made by many previous scholars and researchers which conclude that people within the construction

industry are generally old-fashioned in their ways of doing business and highly resistant to change.

5.6 Conclusion

Business process reengineering is a fundamental and a radical approach to enhance business processes, systems and culture. Transformation in organizations requires changing many of the old principles and assumptions about processes and management. In this period of great fluctuations, it is obvious to spot the huge changes in the management and process requirements, particularly in the construction organizations where functionality and relevance are what matters the most. The construction industry plays a vital part in developing the quality of living for civilizations. Therefore, enhancing the body of knowledge in regards to process, management and change can make a major contribution to the development of the construction industry and hence improving society.

Accomplishing this need happens to be the main objective of this study. This research has examined the perceptions and attitudes toward BPR in the Saudi construction industry, and incorporated a job characteristics model in which jobs are designed around generating value and not only tasks, and where employees are delegated with more authority to judge to and decide on what is better for their designated jobs. This new approach in looking onto BPR is believed to offer a better understanding of BPR in the construction industry. Whereas existing research on the subject of BPR pertaining to the construction industry have merely touched upon areas such as job enlargement, job enrichment and job characteristics model, this research has incorporated these concepts as means to develop a better division of labor and job designs.

While there are general awareness and a positive attitude toward BPR's constituents in the Saudi construction industry, it is needed that organizations within the construction industry start to implement such initiatives and improve their processes and cultures. It is however recommended that management should have first the commitment to initiate such programs and secondly to monitor the changes while it is being implemented. In conclusion, it is the conviction of this study to devise the constituents of business process reengineering in the context of the Saudi construction organizations in order to come up with the best model and practices that fit into this industry.

CHAPTER 6

Conclusion and Recommendations

In this chapter, a summary of the followed research methodology and results for the whole of the research is provided, included also are the concluded remarks drawn out from this research. Lastly, this chapter discusses general recommendations as well as recommendation for future research with regards to the subject.

6.1 Summary and Conclusion

This study is conducted with two research objectives in mind. The main research objective is to assess the readiness of the Saudi construction organizations to implement business process reengineering. The secondary research objective is to explore, perceptions and attitudes of the Saudi construction industry toward constituents of BPR.

In order to achieve the first objective. Evaluating the readiness of the Saudi construction organizations to implement business process reengineering is completed through a field survey that includes a questionnaire, in which respondents answered about prioritizing the core process of the construction organizations and the level of implementation of the identified 20 critical success factors to BPR implementation. The identified critical success factors are grouped into four main categories, they are, information technology, management commitment, organizational structure and management system, and lastly the leadership style. The readiness is calculated as a product of two developed indices, an importance index describing the priority of each core process to start deploying changes to

it, and an implementation index describing the level of implementation of each identified critical success factor in each core process. As for the second objective, it is also completed through conducting a field survey that includes a questionnaire and semi-structured interviews. Exploring perceptions and attitudes involved the respondents in questions about constituents of BPR. Moreover, respondents are asked about two overlooked concepts in BPR similar research, job enlargement and job enrichment and how both could be approached in the Saudi construction industry.

The findings in the first part of the research reveal a major slowdown in the Saudi construction industry with regards to the critical success factors to BPR implementation. Indicating that the Saudi construction organizations are far away from being ready to radical changes. This major slowdown highly manifested itself in improving information technology whether by investing or evaluating it, and adopting state of the art technologies. Moreover, major sluggishness can be seen in areas such as supporting creativity and innovation as well as keeping the employees up to date by involving them in continuous training and learning programs. The results also reveal that the organizational structures in the Saudi construction industry are hierarchic and bureaucratic, where there is little involvement from employees in decision making and strategy thinking.

The foregoing findings in the first part are very different from what is revealed in the second part of the research. Although the respondents are the same, questions relating to their current practices in the organizations differed with their perceptions and attitudes regarding BPR. Results from the perceptions and attitudes section reveal that a large percentage of the considered sample are voting for the constituents of business process reengineering. Respondents have Shown positive attitudes toward business process

reengineering and understanding what can add to the overall performance of their organizations. The respondents also confirm the fact that the proposed constituents are of a great importance to organizations in the construction industry, and it is needed from these organizations to be engaging in BPR programs because of the need for radical changes in the Saudi construction industry. However, answers about how BPR will gain acceptance in the Saudi construction industry and how BPR should be approached have split. Indicating that the culture of resisting change and especially radical changes is still affecting the construction industry and in particular Saudi Arabia. This is where the imperative to enhance the perception about BPR has emerged in this research.

The research also explores two overlooked concepts in BPR similar research pertaining to the construction industry, job enlargement and job enrichment. By incorporating the job characteristics model in the context of the Saudi construction industry. In general, respondents show appreciation for the benefits that could be reaped by the positive effects if the job characteristic model is to be applied in their organizations. Most of the answers confirm that job enlargement and job enrichment can be widely accepted in construction, and at the same time they can create highly motivated employees and perform at higher levels. Managers in the Saudi construction industry can follow the steps provided in this research to enlarge and enrich the jobs in their organizations, in order to achieve higher performance and a healthy division of labor and job designs.

6.2 Contribution of the Research

Business process reengineering is a change management technique, in which changes in an organization are applied radically. The proposition for radical changes in today's highly

fluctuating market is now more important than ever for the construction industry. Being able to capture that change philosophy in construction organizations' business models and cultures will for sure revamp their operations and enhance their reactions to external influences driven by high radicalness as powerful as the drop in oil prices.

This research looks at changes in the construction industry with a prudent eye, as many evident change programs have failed to achieve their intended results. In that sense, the research basically evaluates the organizations' readiness to implement BPR, and by doing so, areas of deficiencies can be pinpointed and then improved, the core business processes are sorted with the priority to implement changes as the first factor to consider and lastly alleviating the risks that are taken when such an initiative is implemented.

Another area in this research is shedding the light on two overlooked concepts in BPR, they are, job enlargement and job enrichment. The intention in bringing the two concepts into picture is to enhance the perceptions about radical changes and BPR in general. Where the general understanding could be by mainly laying off employees and reducing the number of the work force, the research argues differently that organizations can incorporate the two concepts at an early stage to insure that procedures such as excessive laying off are not needed in times of economic slowdown.

While the two discussed earlier in details are the main contributions of this research. There still an ultimate goal in a study conducted in the construction industry medium. This ultimate goal emerges from the fact that the construction industry holds a pivotal role in building up the economy and infrastructure of any nation. Contributions directed toward this industry entails the development of nations as well as civilizations.

6.3 Future Directions

Business process reengineering entails radical changes to an organization's processes, systems, culture and people. Because of the radicalness inherited in the changes made by the implementation of BPR, it comes with a great risk of default and failure. Assessing the readiness therefore comes in handy to eliminate risks of failure and to detect the areas of deficiencies within organizations. In addition to what have been addressed, assessing the readiness can pinpoint the areas of strengths and weaknesses in organizations in order for the management to prioritize where changes should start.

Upon the findings of this study and given the poor track record of the construction industry in innovation and creativity, investing in IT and new technologies, and improving their tools and approaches. The adopted mindset and business model in the Saudi construction organizations are outdated and have to be renewed and renovated. The following listed recommendations are constructed in the light of the deficiencies found in the Saudi construction organizations.

- Investing in IT development and technological advancement, as the pace of those two has amplified in the last decade. Also, to evaluate the effectiveness of the current IT and IS infrastructures, especially in channeling communications. Moreover, trying to integrate the IT with all the business processes to insure more productive and effective work.
- Management need to have a change strategy plan to be well informed about the current standing and a clear insight on the core business processes. Additionally, the management needs to communicate more with projects' teams, insuring that the

needed resources are available and to take accountability for failures in the quality management system.

- Making an egalitarian culture, where it is possible to democratically share information and for the employees to interact with the upper management as well as raising the level of confidence and creativity of employees by involving them in strategy thinking.
- Moreover, promoting collaboration between employees and adopting a multidisciplinary way in solving problems through cross functional teams. Also, ensuring the effectiveness of the quality management system, for example through employing KPI's (Key Performance Indicators).
- Including a reward system that promotes adding value, and to empower employees to make decisions in order for them to create value through their jobs. Also, continuous training for employees is another important point to insure a competent organization, and to support innovation and creativity by giving employees the space to share new and creative ideas.
- Finally, to include the previously mentioned recommendations in all core processes after prioritizing them. In other words, to start the BPR program on the process with the highest priority down to the least. It is important to include all business processes in the BPR program, as each core process is responsible to add value to the overall performance of the organization since it is not the job of only the revenues generating processes.

- Managers in the construction industry should have a clear understanding about their employees' competencies, and how they can enlarge or enrich the jobs within their organizations.
- Following a systematic approach to do job enlargement and job enrichment in construction organizations by incorporating the job characteristics model, where the job characteristics and the psychological state of an employee are taken into consideration.

This research is conducted in the Saudi construction industry, in particular, the building contractors in Saudi Arabia. A similar study can be done on different categories of contractors such as, transportation contractors, industrial and electrical works contractors in addition to other categories. In view of the developed assessment tool, its use can be extended to other forms of organizations and industries. To do so, the core processes associated with a particular industry or an organization can be reworked to fit the merits of that specific industry or organization. Moreover, in parallel with the readiness assessment tool comes the developed methodology for incorporating the job characteristics model, where it can be applied to different industries and organizations, by only adjusting the core processes with their associated trades.

References

1. Abdolvand, N., Albadvi, A., & Ferdowsi, Z. (2008). Assessing Readiness for Business Process Reengineering. *Business Process Management Journal*, 497 - 511.

2. Abdul-Hadi, N., Al-Sudairi, A., & AlQahtani, S. (2005). Prioritizing Barriers to Successful Business Process Re-engineering (BPR) Efforts in Saudi Arabian Construction Industry. *Construction Management and Economics*, 305 - 315.

3. Agarwal, R., Chandrasekaran, S., & Sridhar, M. (2016). *Imagining Construction's Digital Future.* Singapore: Mckinsey Productivity Sciences Center.

4. Ahmad, H., Francis, A., & Zairi, M. (2007). Business Process Reengineering: Critical Success Factors in Higher Education. *Business Process Management*, 451 - 469.

5. Al-Mashari, M., & Zairi, M. (1999). BPR Implementation Process: An Analysis of Key Success and Failure Factors. *Business Process Management*, 87 - 112.

6. Al-Mashari, M., & Zairi, M. (2000). Revisiting BPR: a Holistic Review of Practice and Development. *Business Process Management Journal*, 10 - 42.

7. Al-Mashari, M., Irani, Z., & Zairi, M. (2001). Buiness Process Reengineering: a Survey of International Experience. *Business Process Management Journal*, 437 - 455.

8. Al-Sedairy, S. T. (2001). A Change Management Model for Saudi Construction Industry. *International Journal of Project Management*, 161-169.

9. Assaf, S. A.-K.-H. (1995). Causes of Delay in Large Building Construction Projects. *Journal of Management in Engineering*, 45-50.

10. Attaran, M. (2004). Exploring the Relationship Between Information Technology and Business Process Reengineering. *Information & Management*, 585–596.

11. Betts, M., & Wood-Happer, T. (1994). Re-engineering Construction a New Management Research Agenda. *Construction Management and Economics*, 551-556.

12. Biazzo, S. (1998). A Critical Examination of Business Process Reengineering Phenomenon. *International Journal of Operations and Production Management*, 1000 - 1016.

13. Blanco, J. L., Janauskas, M., & Ribeirinho, M. J. (2016). *Beating the Low-Productivity Trap: How to Transform Construction Opertations* . Philadelphia: Mckinsey Global Institute.

14. Boyle, R. D. (1995). Avoiding Common Pitfalls of Reengineering. *Management Accounting*, 24 - 33.

15. Chan, S. L., & Choi, C. F. (1997). A Conceptual and Analytical Framework for Business Process Reengineering. *International Journal of Production Economics*, 211 - 223.

16. *Contractors Classification Agency*. (2016). Retrieved from https://contractors.momra.gov.sa/: https://contractors.momra.gov.sa/ListOfClassifiedDefaultNewAJ.aspx

17. Corporation, I. (1995). *Business Process Reengineering and Beyond.* San Jose: IBM Corporation.

18. Crowe, T. J., Fong, P. M., Baumen, T. A., & Zayas-Castro, J. L. (2002). Quantitative Risk Level Estimation of Business Process Reengineering . *Business Process Management Journal*, 490 - 511.

19. D.Holt, G. (2014). Asking Questions, Analysing Answers: Relative Importance Revisited. *Construction Innovation*, 2-16.

20. Davenport, T. H., & Sbort, J. E. (1990). The New Industrial Engineering: Information Technology And Business Process Redesign. *Sloan Management Review*, 11 - 27.

21. Fisk, E. R., & Reynolds, W. D. (2014). *Construction Project Administration.* New Jersey: Pearson Education.

22. Goksoy, A., Ozsoy, B., & Vayvay, O. (2012). Business Process Reengineering: Strategic Tool for Managing Organizational Change an Application in a Multinational Company. *International Journal of Business and Management*, 89 - 112.

23. Hackman, J. R., & Oldham, G. R. (1980). *Work Redesign.* Reading, MA: Addison-Wesley.

24. Hammer, M. (1990). Reengineering Work: Don't Automate, Obliterate. *Harvard Business Review*, 104 - 112.

25. Hammer, M., & Champy, J. (1993). *Reengineering the Corporation a Manifesto for Business Revolution.* New York: Harper Business.

26. Hayes, P., Rezgui, Y., Cooper, G., & Mitev, N. (1998). Information Technology-Enabled BPR in The Construction Industry. *Knowledge and Process Management*, 172-184.

27. *https://www.chamber.org.sa/*. (2016). Retrieved from AlSharqia Chamber: https://www.chamber.org.sa/sites/English/

28. Im, I., El Sawy, O. A., & Hars, A. (1999). Competence and impact of tools for BPR. *Information & Management*, 301-311.

29. Jones, G. R., & George, J. M. (2016). *Contemporary Management* (Ninth ed.). New York, United States of America: McGraw Hill Education.

30. Katzenbach, J. R., & Smith, D. K. (1993). The Rules for Managing Cross-Functional Reengineering Teams. *Planning Review*, 12 - 13.

31. Kish, L. (1965). *Survey Sampling.* New York: John Wiley & Sons.

32. Lee, J. (1995). *An Exploratory Study of Organizational/Managerial Factors Influencing Business Process Reengineering Implementation: An Empirical Study of Critical Success Factors and Resistance Management.* Nebraska: ETD Collection for University of Nebraska - Lincoln.

33. Mohamed, S., & Tucker, S. (1996). Options for Applying BPR in the Australian Construction Industry. *International Journal of Project Management*, 379-385.

34. (2016). *National Transformation Plan 2020.* Saudi Vision 2030. Retrieved from vision2030.gov.sa: http://vision2030.gov.sa/sites/default/files/NTP_En.pdf

35. Ozcelik, Y. (2010). Do Business Process Reengineering Projects Payoff? Evidence from the United States. *International Journal of Project Management*, 7 - 13.

36. Paper, D., & Chang, R.-D. (2005). The State of Business Process Reengineering: A Search for Success Factors. *Total Quality Management*, 121 - 133.

37. Peppard, J., & Fitzgeraild, D. (1997). The Transfer of Culturally-Grounded Management Techniques: The Case of Business Reengineering in Germany. *European Management Journal*, 446 - 460.

38. Rahali, E., Chaczko, Z., Agbinya, J., & Chiu, C. (2009). Business Process Re-engineering in Saudi Arabia: A Survey of Understanding and Attitudes. *International Journal of Artificial Intelligence and Interactive Multimedia*, 33-38.

39. Ranganathan, C., & Dhaliwal, J. S. (2001). A Survey of Business Process Reengineering Practices in Singapore. *Information and Management*, 125-134.

40. Shmidt, S. L. (1998). A Process-based View and its Influence on Strategic Management. *Knowledge and Process Management*, 58 - 63.

41. Sutcliffe, N. (1999). Leadership Behavior and Business Process Reengineering (BPR) Outcomes An Empirical Analysis of 30 BPR Projects. *Information and Management*, 273-286.

42. Teng, J. T., Grover, V., & Fedler, K. D. (1994). Business Process Reengineering: Charting a Strategic Path for the Information Age. *California Management Review*, 9 - 31.

43. Wu, I.-L. (2002). A model for implementing BPR based on strategic perspectives: an empirical study. *Information & Management*, 313-324.

44. Wu, I.-L. (2003). Understanding Senior Management's Behavior in Promoting the Strategic Role of IT in Process Reengineering: Use of the theory of Reasoned Action. *Information & Management*, 1-11.

Appendix A:

Survey Questionnaire (1): The Readiness of the Construction Industry to Change: An Assessment Through the Lens of Business Process

Dear Respondent,

We thank you for taking the time to fill the questionnaire, your contribution to the industry improvement is highly appreciated. Kindly answer the questions in the following section then read the instructions below to guide you in completing the survey.

I. General Information

1. Job Position

---

2. Educational Background (Bachelor's Degree and/or higher)

---

3. Years of Experience

---

4. Company's Capital (millions) "Optional"

In the following section you will be provided a table of core processes against several organizational practices. The instructions below will guide you in completing the table:

1. In the first horizontal row, insert a number from (1-5) corresponding to the value of each process in the organization.
2. Answering with "1" gives the least rank and "5" gives the highest.
3. Value of the process means the value of its revenue generation and value to the company's competencies as well as the importance to improve it.
4. After completing this step, below each organizational practice, there are several factors to that practice.
5. Insert a number from (1-5) against each factor, taking into consideration the importance of that specific factor in the core process it crosses.
6. Answering with "1" indicates lowest importance for that factor and "5" indicates the highest importance.

		Core Processes						
	Organizational Practices	**Projects**	**Bidding &Tendering**	**Finance**	**HR**	**Admin.**	**Inventory Control & Logistics**	**Purchasing**
	Insert a rank for each core process							
#	**A. Information Technology**							
1	Information technology is integrated with all business processes of the organization							
2	The organization heavily rely on using the information system							
3	The IT infrastructure is efficient in channeling communications							
4	The company invest a percentage of the revenues in IT development							
5	The company evaluates the IT effectiveness frequently							
#	**B. Management Commitment**							
1	The top management have adequate knowledge about the organization status							
2	Top management communicates with project teams frequently							
3	Ensuring that resources needed for the quality management system are available							
4	Top management have a well-defined strategic vision							
5	Taking accountability for the quality management system effectiveness							

#	C. Management System and Organizational Structure							
1	The reward system is based on performance and generating value rather than working hours							
2	Top management support innovation and creativity							
3	The employees are empowered to make decisions (less bureaucracy)							
4	There are continuous training/educational programs to update employees' skills							
#	**D. Leadership Style**							
1	Top management share vision and strategy of the company with the employees							
2	There is an open communication between employees and top management							
3	Employees are involved in strategy making and thinking							
4	There are friendly interactions between co-workers							
5	Cross functional teams are a typical way in solving problems							
6	Ensuring that the quality management system achieves its results							

Appendix B:

Survey Questionnaire (2): Enhancing the business process reengineering perception in the construction industry: the case of Saudi Arabia

Kindly answer the below questions related to the construction organization:

Part I: (Perceptions)

1. **How does an effective "Leadership" emanate in the construction organization?**

a. *Authoritarian Style* i.e. Top management engage with employees through multiple organizational levels

b. *Egalitarian Style* i.e. Top management engage with employees through open communication systems

c. *Delegative Style* i.e. Top management do not engage with employees and leave all decision making up to group members

2. **How does "management commitment" come into picture in the construction organization?**

a. Providing adequate resources when needed and continuous involvement in improving internal functions of the organization

b. Management are committed to the organization's strategy and vision

c. Management have frequent meetings with the employees

3. **What is the role of IT in construction organizations?**

a. Enterprise resource planning systems, e.g. Oracle and SAP

b. Projects related software or PMIS e.g. Primavera and MS projects

c. IT should be integrated with all functions of the organization

4. **What are the fit qualities of an effective communication system (Meetings, Reporting systems, Cross-functional communications... etc.)?**

a. Enables timely information and has user friendly interface if done through IT systems
b. An effective communication system is mainly integrated with IT
c. Effective communication system only requires decent coordination

5. **What comprises a healthy organizational structure for organizations in the construction industry?**

a. Rigid and bureaucratic management system

b. Flexible system & team members are delegated with more authority

c. Full autonomy for team members and lower tier employees

6. **What comprises a good reward system in construction organizations?**

a. Reward system based on worked hours

b. Reward system based on performance

7. **How would you describe the employees' competency in general in the Saudi construction organizations?**

a. Poor b. Average c. Excellent

BPR Business Process Reengineering is a management improvement tool and a revolutionary approach to radically change the processes that an organization performs. BPR entails success through changing several organizational dimensions such as, leadership style, top management commitment, organizational structure and IT infrastructure. A successful BPR can add to the overall performance of the organization, increase the competency level of employees and transform its IT infrastructure.

8. **Based on what was explained in the passage, what is your view on the concept of BPR (Business Process Reengineering)?**

a. Laying off employees and downsizing when economic downturns occur

b. Rethinking and redesigning of business processes to response to changes

c. Reengineering the business processes to retain a competitive advantage in the market

Part 2: (Attitudes)

1. **Do employees in construction organizations have the adequate competency to;**

A. Job Enlargement: Increasing the number of different tasks in a given job

a. Yes b. No

B. Job Enrichment: Increasing the degree of responsibility an employee has over the job

a. Yes b. No

2. **Indicate the "Trade" that can be improved by inserting a tick mark to include Job Enlargement "A", Job Enrichment "B" or both.**

Competency / **Trade**	**A**	**B**	**Comments**
Projects			
Site Engineers			
Site Supervisory Staff			
Material Expediter			
Laborer			
Operator			
Concreter			
Steel Fixer			
Plasterer			
Electrician			
Welder			
Carpenter			
Drain layer			
Survey Leveler			
Other			Specify:

Bidding & Tendering			
Preliminary Scheduling			
Preliminary Estimation			
Marketing Teams			
Other			Specify:
Finance			
Cash flow management			
Project financing teams			
Accounting Department			
Other			Specify:
HR			
Training and Development			
Employees Acquisition			
Other			Specify:
Admin.			
Government Relations			
Public Relations			
Other			Specify:
Logistics & Inventory Control			
Logistics (construction logistics plan, waste disposal teams...etc.)			
Machinery Maintenance			
Plants/Equipment related employees			
Other			Specify:

Purchasing			
Sourcing teams (suppliers, machinery, warehouses)			
Procurement Department			
Other			Specify:

3. Insert a tick mark in the box corresponding to your answer.

Question \ Answer	Yes	No
Do you think that employees' engagement and top management commitment in construction organizations are important improvement factors		
Do you think that utilizing new technologies and IT systems can add to the overall performance of the organization		
Do you think that the leadership style in the construction organizations can affect the performance		
Do you think that a healthy organizational structure and reward system can have a positive impact on the organization		
Do you think that there is a need for improvement in the Saudi Construction Industry		
Do you think that construction organizations are able to adopt management improvement tools to advance their processes		
Do you think that those improvement tools will receive acceptance and have positive impacts in construction organizations		

4. How do you think improvements to the organization should be approached in the Saudi construction industry?

a. Top Down Approach (Radical) b. Bottom Up Approach (Gradual)

Appendix C:

Responses to Survey Questionnaire (1): Ranking of Core Processes + Ranking of Critical Success Factors

	Ranks							
Core Processes	**1**	**2**	**3**	**4**	**5**	IMPRT. I	Total N	IMPRT.I (%)
Projects	0	0	2	3	26	0.955	31	95.5
Bidding & Tendering	1	1	4	9	16	0.845	31	84.5
Finance	0	2	5	11	13	0.826	31	82.6
HR	1	2	9	11	8	0.748	31	74.8
Admin.	2	5	11	6	7	0.671	31	67.1
Inventory Control & Logistics	2	4	8	11	6	0.697	31	69.7
Purchasing	2	1	6	11	11	0.781	31	78.1

	Core Process Rank (Projects)							
Practices	1	2	3	4	5	IMPl.I	Total N	IMPl.I (%)
A. Information Technology								
1	3	3	6	9	10	0.729	31	72.9
2	1	7	6	11	6	0.690	31	69.0
3	1	7	3	9	11	0.742	31	74.2
4	8	5	10	7	1	0.523	31	52.3
5	7	5	8	10	1	0.555	31	55.5
B. Management Commitment								
1	1	1	5	9	15	0.832	31	83.2
2	0	3	8	8	12	0.787	31	78.7
3	2	4	4	12	9	0.742	31	74.2
4	3	1	5	7	15	0.794	31	79.4
5	3	3	4	10	11	0.748	31	74.8
C. Management System								
1	3	1	6	10	11	0.761	31	76.1
2	3	3	5	7	13	0.755	31	75.5
3	2	4	5	14	6	0.716	31	71.6
4	5	9	5	6	6	0.594	31	59.4
D. Leadership Style								
1	5	3	6	11	6	0.665	31	66.5
2	2	6	3	13	7	0.710	31	71.0
3	6	3	8	10	4	0.619	31	61.9
4	2	1	8	14	6	0.735	31	73.5
5	3	0	9	13	6	0.723	31	72.3
6	2	2	5	13	9	0.761	31	76.1

	Core Process Rank (Bidding & Tendering)							
Practices	1	2	3	4	5	IMPl.I	Total N	IMPl.I (%)
A. Information Technology								
1	1	1	9	12	8	0.761	31	76.1
2	2	3	11	11	4	0.677	31	67.7
3	3	4	5	11	8	0.710	31	71.0
4	6	10	6	7	2	0.529	31	52.9
5	6	10	7	7	1	0.516	31	51.6
B. Management Commitment								
1	1	1	4	9	16	0.845	31	84.5
2	2	2	6	10	11	0.768	31	76.8
3	2	4	12	5	8	0.684	31	68.4
4	2	3	5	7	14	0.781	31	78.1
5	3	4	7	7	10	0.710	31	71.0
C. Management System								
1	3	0	9	11	8	0.735	31	73.5
2	3	3	9	4	12	0.723	31	72.3
3	4	2	11	10	4	0.652	31	65.2
4	6	8	7	7	3	0.555	31	55.5
D. Leadership Style								
1	6	3	7	8	7	0.645	31	64.5
2	2	6	5	10	8	0.703	31	70.3
3	6	6	12	5	2	0.542	31	54.2
4	2	1	8	13	7	0.742	31	74.2
5	2	4	9	13	3	0.671	31	67.1
6	3	3	9	10	6	0.684	31	68.4

	Core Process Rank (Finance)							
Practices	1	2	3	4	5	IMPl.I	Total N	IMPl.I (%)
A. Information Technology								
1	0	1	8	11	11	0.806	31	80.6
2	0	3	9	11	8	0.755	31	75.5
3	0	3	4	15	9	0.794	31	79.4
4	3	7	9	8	4	0.619	31	61.9
5	5	6	8	8	4	0.600	31	60.0
B. Management Commitment								
1	2	1	2	8	18	0.852	31	85.2
2	1	3	7	6	14	0.787	31	78.7
3	2	5	7	10	7	0.697	31	69.7
4	2	3	8	7	11	0.742	31	74.2
5	4	1	10	7	9	0.703	31	70.3
C. Management System								
1	4	1	11	10	5	0.671	31	67.1
2	3	3	8	10	7	0.697	31	69.7
3	2	8	15	4	2	0.574	31	57.4
4	6	7	10	6	2	0.542	31	54.2
D. Leadership Style								
1	5	4	4	12	6	0.665	31	66.5
2	5	3	6	8	9	0.684	31	68.4
3	8	5	11	6	1	0.516	31	51.6
4	2	2	8	13	6	0.723	31	72.3
5	4	3	10	11	3	0.639	31	63.9
6	4	2	6	13	6	0.697	31	69.7

	Core Process Rank (HR)							
Practices	1	2	3	4	5	IMPl.I	Total N	IMPl.I (%)
A. Information Technology								
1	0	3	15	7	6	0.703	31	70.3
2	3	6	9	11	2	0.619	31	61.9
3	0	6	7	9	9	0.735	31	73.5
4	6	6	9	7	3	0.568	31	56.8
5	5	9	8	6	3	0.555	31	55.5
B. Management Commitment								
1	0	3	9	11	8	0.755	31	75.5
2	2	4	9	10	6	0.690	31	69.0
3	4	4	10	11	2	0.619	31	61.9
4	1	4	12	8	6	0.690	31	69.0
5	3	3	10	9	6	0.677	31	67.7
C. Management System								
1	4	2	13	6	6	0.652	31	65.2
2	3	4	9	9	6	0.671	31	67.1
3	3	8	13	6	1	0.561	31	56.1
4	5	9	11	5	1	0.523	31	52.3
D. Leadership Style								
1	5	5	9	6	6	0.619	31	61.9
2	4	4	7	8	8	0.677	31	67.7
3	7	9	12	3	0	0.471	31	47.1
4	1	1	10	13	6	0.742	31	74.2
5	4	4	13	7	3	0.606	31	60.6
6	4	3	9	12	3	0.645	31	64.5

	Core Process Rank (Admin.)							
Practices	1	2	3	4	5	IMPl.I	Total N	IMPl.I (%)
A. Information Technology								
1	1	4	12	7	7	0.697	31	69.7
2	2	9	7	10	3	0.619	31	61.9
3	1	6	6	12	6	0.703	31	70.3
4	7	5	10	7	2	0.548	31	54.8
5	6	8	8	7	2	0.542	31	54.2
B. Management Commitment								
1	0	3	8	11	9	0.768	31	76.8
2	1	3	12	12	3	0.684	31	68.4
3	4	4	14	7	2	0.594	31	59.4
4	1	4	9	11	6	0.710	31	71.0
5	3	5	10	7	6	0.652	31	65.2
C. Management System								
1	4	1	12	10	4	0.658	31	65.8
2	3	2	13	7	6	0.671	31	67.1
3	2	10	14	4	1	0.548	31	54.8
4	5	13	8	3	2	0.497	31	49.7
D. Leadership Style								
1	5	7	8	8	3	0.581	31	58.1
2	5	4	6	8	8	0.665	31	66.5
3	7	9	12	2	1	0.477	31	47.7
4	0	0	12	14	5	0.755	31	75.5
5	6	2	11	9	3	0.606	31	60.6
6	3	5	12	8	3	0.619	31	61.9

	Core Process Rank (Inventory Control & Logistics)							
Practices	1	2	3	4	5	IMPl.I	Total N	IMPl.I (%)
A. Information Technology								
1	1	1	7	9	13	0.806	31	80.6
2	0	3	12	10	6	0.723	31	72.3
3	1	3	11	8	8	0.723	31	72.3
4	6	6	10	4	5	0.574	31	57.4
5	7	7	5	8	4	0.568	31	56.8
B. Management Commitment								
1	1	3	12	9	6	0.703	31	70.3
2	2	6	8	12	3	0.652	31	65.2
3	3	6	8	9	5	0.645	31	64.5
4	1	7	10	6	7	0.671	31	67.1
5	4	6	7	8	6	0.639	31	63.9
C. Management System								
1	5	2	7	13	4	0.658	31	65.8
2	4	5	7	6	9	0.671	31	67.1
3	2	9	15	4	1	0.555	31	55.5
4	6	7	12	5	1	0.523	31	52.3
D. Leadership Style								
1	5	5	9	9	3	0.600	31	60.0
2	4	6	8	7	6	0.632	31	63.2
3	7	11	10	3	0	0.458	31	45.8
4	0	3	11	12	5	0.723	31	72.3
5	4	4	8	14	1	0.626	31	62.6
6	3	4	12	8	4	0.639	31	63.9

	Core Process Rank (Purchasing)							
Practices	1	2	3	4	5	IMPl.I	Total N	IMPl.I (%)
A. Information Technology								
1	0	3	8	10	10	0.774	31	77.4
2	0	2	13	9	7	0.735	31	73.5
3	0	5	6	11	9	0.755	31	75.5
4	4	4	13	4	6	0.626	31	62.6
5	10	5	4	8	4	0.542	31	54.2
B. Management Commitment								
1	0	5	5	15	6	0.742	31	74.2
2	1	5	4	13	8	0.742	31	74.2
3	2	4	10	9	6	0.684	31	68.4
4	2	2	7	12	8	0.742	31	74.2
5	4	2	8	8	9	0.703	31	70.3
C. Management System								
1	4	1	9	10	7	0.697	31	69.7
2	4	4	7	7	9	0.684	31	68.4
3	2	9	13	6	1	0.568	31	56.8
4	5	9	9	6	2	0.542	31	54.2
D. Leadership Style								
1	5	4	10	7	5	0.619	31	61.9
2	3	8	4	7	9	0.671	31	67.1
3	7	8	9	7	0	0.503	31	50.3
4	0	4	10	10	7	0.729	31	72.9
5	4	1	10	13	3	0.665	31	66.5
6	3	3	8	12	5	0.684	31	68.4

Appendix D:

Responses to Survey Questionnaire (2)

Q: How does an effective “Leadership” emanate in the construction organization?

Answer Choices	Responses
Authoritarian Style i.e. Top management engage with employees through multiple organizational levels	**38.71%** 12
Egalitarian Style i.e. Top management engage with employees through open communication systems	**54.84%** 17
Delegative Style i.e. Top management do not engage with employees and leave all decision making up to group members	**6.45%** 2
Total	**31**

Q: How does “management commitment” come into picture in the construction organization?

Answer Choices	Responses
Providing adequate resources when needed and continuous involvement in improving internal functions of the organization	**45.16%** 14
Management are committed to the organization’s strategy and vision	**41.94%** 13
Management have frequent meetings with the employees	**12.90%** 4
Total	**31**

Q: What is the role of IT in construction organizations?

Answer Choices	Responses	
Enterprise resource planning systems, e.g. Oracle and SAP	**22.58%**	7
Projects related software or PMIS e.g. Primavera and MS projects	**19.35%**	6
IT should be integrated with all functions of the organization	**58.06%**	18
Total	**31**	

Q: What are the fit qualities of an effective communication system (Meetings, Reporting systems, Cross-functional communications... etc.)?

Answer Choices	Responses	
Enables timely information and has user friendly interface if done through IT systems	**54.84%**	17
An effective communication system is mainly integrated with IT	**22.58%**	7
Effective communication system only requires decent coordination	**22.58%**	7
Total	**31**	

Q: What comprises a healthy organizational structure for organizations in the construction industry?

Answer Choices	Responses	
Rigid and bureaucratic management system	**16.13%**	5
Flexible system & team members are delegated with more authority	**80.65%**	25
Full autonomy for team members and lower tier employees	**3.23%**	1
Total	**31**	

Q: What comprises a good reward system in construction organizations?

Answer Choices	Responses	
Reward system based on worked hours	**6.4%**	2
Reward system based on performance	**93.6%**	29
Total	**31**	

Q: How would you describe the employees' competency in general in the Saudi construction organizations?

Answer Choices	Responses	
Poor	**12.90%**	4
Average	**87.10%**	27
Excellent	**0.00%**	0
Total	**31**	

Q: Based on what was explained in the passage, what is your view on the concept of BPR (Business Process Reengineering)?

Answer Choices	Responses	
Laying off employees and downsizing when economic downturns occur	**3.23%**	1
Rethinking and redesigning of business processes to response to changes	**41.94%**	13
Reengineering the business processes to retain a competitive advantage in the market	**54.84%**	17
Total	**31**	

Q: Do employees in construction organizations have the adequate competency to, A. Job Enlargement: Increasing the number of different tasks in a given job.

Answer Choices	Responses	
Yes	**70.97%**	22
No	**29.03%**	9
Total		**31**

Q Do employees in construction organizations have the adequate competency to, B. Job Enrichment: Increasing the degree of responsibility an employee has over the job.

Answer Choices	Responses	
Yes	**74.19%**	23
No	**25.81%**	8
Total	**31**	

Q: Indicate the trade that can be improved in Projects (You can select both options)

	Job Enlargement	Job Enrichment	Total Respondents
Site Engineers	**70.97%** 22	**83.87%** 26	31
Site Supervisory Staff	**58.06%** 18	**74.19%** 23	31
Material Expediter	**58.62%** 17	**55.17%** 16	29
Laborer	**66.67%** 18	**44.44%** 12	27
Operator	**51.85%** 14	**62.96%** 17	27
Concreter	**70.37%** 19	**44.44%** 12	27
Steel Fixer	**70.37%** 19	**40.74%** 11	27
Plasterer	**69.23%** 18	**46.15%** 12	26
Electrician	**70.37%** 19	**48.15%** 13	27
Welder	**69.23%** 18	**50.00%** 13	26
Carpenter	**70.37%** 19	**44.44%** 12	27
Drain layer	**61.54%** 16	**50.00%** 13	26
Survey Leveler	**74.07%** 20	**48.15%** 13	27

Q: Indicate the trade that can be improved in Bidding & Tendering (You can select both options)

	Job Enlargement	Job Enrichment	Total Respondents
Preliminary Scheduling	**68.97%** 20	**75.86%** 22	29
Preliminary Estimation	**68.97%** 20	**79.31%** 23	29
Marketing Teams	**63.33%** 19	**73.33%** 22	30

Q: Indicate the trade that can be improved in Finance (You can select both options)

	Job Enlargement	Job Enrichment	Total Respondents
Cash flow management	**70.00%** 21	**76.67%** 23	30
Project financing teams	**60.00%** 18	**76.67%** 23	30
Accounting Department	**73.33%** 22	**66.67%** 20	30

Q: Indicate the trade that can be improved in HR (You can select both options)

	Job Enlargement	Job Enrichment	Total Respondents
Training and Development	**83.33%** 25	**56.67%** 17	30
Employees Acquisition	**65.52%** 19	**68.97%** 20	29

Q: Indicate the trade that can be improved in Administration (You can select both options)

	Job Enlargement	Job Enrichment	Total Respondents
Government Relation	**66.67%** 20	**66.67%** 20	30
Public Relations	**58.62%** 17	**65.52%** 19	29

Q: Indicate the trade that can be improved in Inventory Control & Logistics (You can select both options)

	Job Enlargement	Job Enrichment	Total Respondents
Logistics (construction logistics plan, waste disposal teams...etc.)	**66.67%** 20	**76.67%** 23	30
Machinery, equipment control and maintenance teams	**74.07%** 20	**62.96%** 17	27
Plants/Equipment related employees	**74.07%** 20	**55.56%** 15	27

Q: Indicate the trade that can be improved in Purchasing (You can select both options)

	Job Enlargement	Job Enrichment	Total Respondents
Resourcing teams (suppliers, machinery, warehouses)	**73.08%** 19	**69.23%** 18	26
Procurement Department	**58.06%** 18	**90.32%** 28	31

Q: Tick the option corresponding to your answer.

	Yes	No	Total
Do you think that employees' engagement and top management commitment in construction organizations are important improvement factors	**100.00%** 31	**0.00%** 0	31
Do you think that utilizing new technologies and IT systems can add to the overall performance of the organization	**100.00%** 31	**0.00%** 0	31
Do you think that the leadership style in the construction organizations can affect the performance	**93.55%** 29	**6.45%** 2	31
Do you think that a healthy organizational structure and reward system can have a positive impact on the organization	**100.00%** 31	**0.00%** 0	31
Do you think that there is a need for improvement in the Saudi Construction Industry	**96.77%** 30	**3.23%** 1	31
Do you think that construction organizations are able to adopt management improvement tools to advance their processes	**83.87%** 26	**16.13%** 5	31
Do you think that those improvement tools will receive acceptance and have positive impacts in construction organizations	**70.97%** 22	**29.03%** 9	31

Q: How do you think improvements to the organization should be approached in the Saudi construction industry?

Answer Choices	Responses
Top Down Approach (Radical)	**51.61%** 16
Bottom Up Approach (Gradual)	**48.39%** 15
Total	**31**

Vitae

Name :Ahmad Abzakh

Nationality :Jordanian

Date of Birth :12/5/1992

Email :92abzakh@gmail.com

Address :Riyadh, Exit 6, Abu Bakr Al Seddiq Road

Academic Background :Graduated with a Bachelor's in Civil Engineering, focused on structures, environment and water treatment related subjects. Completed my Master's Degree in Construction Engineering and Management. The thesis mainly focuses on change management and ways in approaching it in the construction industry. Research interests are mainly an extension of my thesis subject which can be strictly included under the management theory umbrella, they are, change management, organizational design and theory and behavioral management.